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—Tennyson

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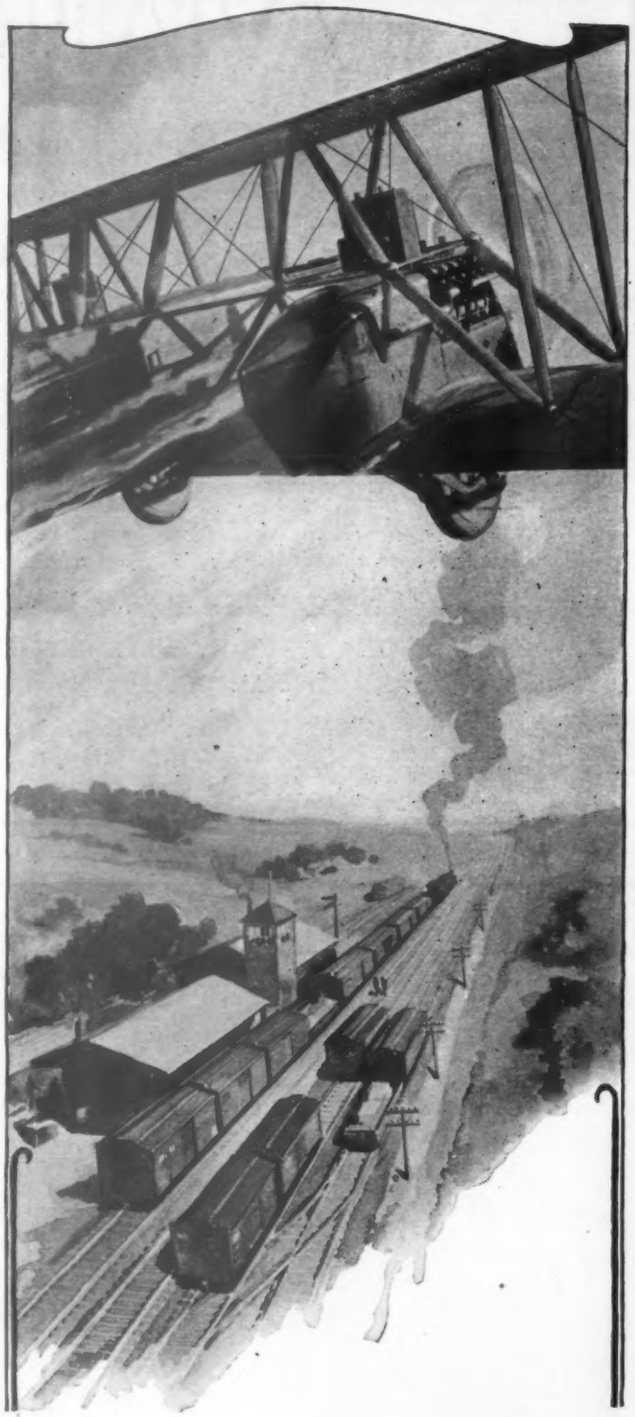

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Two Important Events

TWO recent happenings in Washington which have had to do with government aviation are so important that it is difficult to interpret the consequences with certainty.

The clearing of the difficulties that Brig. General Mitchell has had with both the War and Navy Departments will retain in the Air Service our most prominent flying officer. While all the difficulty seems to be over, there are still rumblings of other changes in the Army Air Service which would bring to the branch the service of one of the most distinguished A.E.F. officers. That General Pershing as Chief of Staff will wish to have some of his former officers as the heads of important branches is only natural and the Army is looking toward July with interest.

Senator Borah has started the Congressional policy of economy and consolidation by offering a resolution placing the duties of the National Advisory Committee for Aeronautics under the Executive departments which would logically handle them. This step is in line with the imperative necessity for economy in all government activities and if $250,000 a year can be saved or even reduced it deserves Congressional consideration. The recent activities of the National Advisory Committee have been so clearly a reflection of the policy of existing departments that its function as an advisory is practically without effect. The overruling of the desires of the civilian members of the committee which reported to the President has created the impression that the Committee's function is properly a departmental activity and as such its work should be under more direct supervision.

The Status of Federal Air Legislation

DOUBTS are often expressed as to the constitutional right of the federal government to regulate air navigation, it being claimed that this is a prerogative of the various states. It is interesting to hear in this connection the opinion of a distinguished lawyer, S. H. Philbin, as expressed in a paper read before the Semi-Annual meeting of the Society of Automotive Engineers.

Mr. Philbin went on record saying that each State of the United States has full power to control and regulate aircraft within its limits, until Congress has exercised its constitutional power "to regulate commerce with foreign nations, and among the several States, and with the Indian tribes." (Constitution of the United States, Art. I, Sect. 8.) He proceeded to show that Congress has jurisdiction to enact legislation covering not only aircraft engaged in flying between States, but also aircraft which, although solely within one State, may interfere with aircraft engaged in interstate or governmental business. The State and Federal courts would have concurrent jurisdiction over all questions arising out of legislation applicable to aircraft, but a suit brought in a State court could be removed to the Federal court.

An Advanced Naval Design

ALTHOUGH no detailed information is yet at hand regarding the new twin-engined cantilever seaplane the Navy is testing at Rockaway naval air station, private reports state that the machine has performed satisfactorily.

This is distinctly gratifying in view of the fact that the machine represents a decided advance in the design of our naval aircraft, for it is quite a step from the strut-and-wire braced F-5-L's to the internally trussed monoplane wing and the wing-enclosed engines of the new naval seaplane.

It is to be hoped that the Navy will continue its advance in aircraft design. Naval air tradition is, despite its youth, something to be proud of—were it for nothing but the triumph of the NC's. Let the Navy continue on this road of advanced aeronautical designing by creating a folding-wing torpedo-carrying amphibian which may be carried on the fast aircraft carriers Congress has authorized. Land machines with emergency flotation bags and orthodox seaplanes have not proved a success in connection with aircraft carriers. It would seem that a folding-wing amphibian may satisfactorily solve this problem of fleet scouting, which is of the greatest importance in a naval engagement.

Ground Interference

IT has long been thought that on landing the interference between the wings and the ground increased the lift to a perceptible extent and diminished the landing speed. It has also been thought that ground interference improved the get-away of a plane in much the same manner.

A recent paper by Dr. A. F. Zahm and R. N. Bear somewhat combats these conceptions. A thorough series of tests in the wind tunnel, where the effect of the ground was simulated by a ground plane parallel to the walls of the tunnel, indicated that as a wing approaches the ground the lift increases for small angles of incidence and decreases at large angles of incidence. The L/D improves for small angles of incidence and decreases for large angles of incidence.

While these experiments are entirely original and have only been carried out in one tunnel, valuable conclusions may tentatively be drawn from the results obtained. It is unfair to decrease an estimate of landing speed on the score of ground interference. If anything, when the machine lands at a high angle of incidence the landing speed will be somewhat greater than the theoretical estimate. On the other hand, the length of run will be shorter than theoretically computed. On the get-away, however, if the machine is taxied at a low angle of incidence the ground interference will improve the time and distance in getting up to flying speed. It is highly satisfactory to have work of this character carried out and a debatable point cleared up.

General Mitchell Retained in Air Service

Secretary of War Weeks Adjusts Differences between Chief Air Service Officers

When Maj. Gen. Charles T. Menoher, Chief of Air Service, requested that Brig. Gen William Mitchell be relieved as Assistant Chief, Secretary of War Weeks stated that he hoped to be able to retain the services of both officers and straighten out the differences that had occurred between them. On June 17 Secretary Weeks gave them his instructions and General Menoher withdrew his request. The Secretary of War has made the following statement regarding the matter:

"In making this announcement the Secretary of War stated that the recommendation made by General Menoher in this matter was based upon reasons submitted with the letter which, in the opinion of the Secretary of War, justified his action. The Secretary, however, believing that in the interests of the Air Service and of the Government itself such action would be undesirable and unfortunate at this time, has been able to secure a satisfactory adjustment of the difficulties involved.

"General Menoher was selected to be the head of the Air Service because he was a man of fine fighting record in France, a man of good judgment and level head and a very capable executive. He is not only the nominal head, but he is the actual head of the Air Service and as such is responsible for all policies in that department.

"General Mitchell was selected for duty as assistant to General Menoher because of his fine flying record in France and because he was primarily a flyer. His personal knowledge of the flying game was thus put at the disposal of General Menoher in the training of the personnel of the Army Air Service.

"It is the desire of the secretary and he intends to accomplish that desire, to utilize the excellent qualities of both these officers to the fullest extent, each in his special sphere, but he holds General Menoher responsible for the entire conduct of the air service as its legal and actual head.

"Finally, it is now clearly understood by both Generals Menoher and Mitchell that the actions of the latter, which were the reasons for General Menoher's recommendation for the relief of General Mitchell, will not be repeated."

Senator Borah Wants N.A.C.A. Abolished

Introduces Resolution Transferring N.A.C.A. Duties to Existing Government Departments

Senator Borah of Idaho introduced on June 17 a joint resolution abolishing the National Advisory Committee for Aeronautics. The text of the resolution follows:

Joint Resolution

ABOLISHING THE ORGANIZATION KNOWN AS THE NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS, AND TRANSFERRING ITS PROPERTY AND DUTIES TO EXISTING GOVERNMENTAL AGENCIES.

Whereas an act making appropriations for the Naval Service for the fiscal year ending June 30, 1916, and for other purposes of March 3, 1915, known as H.R. 20975, and further known as Public 271, created a body known as "Advisory Committee for Aeronautics"; and

Whereas, at this time, the necessity for economy demands a consolidation, where possible, of governmental agencies whose authorities are overlapping, and whose duties result in duplication,:

Now, therefore be it

RESOLVED BY THE SENATE AND HOUSE OF REPRESENTATIVES OF THE UNITED STATES OF AMERICA IN CONGRESS ASSEMBLED,

That the body known as the National Advisory Committee for Aeronautics is hereby abolished as such.

SEC. 2. That the technical duties that have heretofore been carried on by the body, or that have heretofore by law been charged to the body, be, and they are hereby, transferred to the Department of Commerce, to be carried out by the Bureau of Standards.

SEC. 3. That the technical equipment now in the possession of the National Advisory Committee for Aeronautics be, and it is hereby, transferred to the Department of Commerce, to be available for the work of the Bureau of Standards.

SEC. 4. That the buildings and real estate now belonging to the National Advisory Committee for Aeronautics at present on Military or Naval Reservations be, and they are hereby, transferred to the War Department or Navy Department as the case may be.

SEC. 5. That such duties of the National Advisory Committee for Aeronautics as relate to its advisory capacity on the subject of Aeronautics be, and they are hereby, transferred to the War Council, as created by the National Defense Act approved June 3, 1916, as amended by acts subsequent to June 3, 1916, to and including the Act of June 4, 1920.

Initial Test of New Army Aircraft

On May 12, 1921, two new airplanes built for the Air Service were given their initial flights at McCook Field, Dayton, Ohio. The Loening PW-2, single seater pursuit airplane was flown by Lt. J. A. Macready, who reported that the airplane handled very well, was quite pleasant to fly and possessed excellent visibility. He experienced no difficulties on the flight, which lasted about half an hour, during which time he tried very thoroughly the various flying qualities of the airplane. The airplane is equipped with a 300 hp. Wright engine with a four bladed propeller, and carries full military equipment for the single seater pursuit airplane developed during the war, being a monoplane with the wing attached to the upper longerons and braced by diagonal struts to the lower longerons of the fuselage.

The G. Elias TA-1 training airplane was flown by Lt. George B. Patterson who reported that the airplane balanced perfectly and seemed very light and responsive to the controls. It appears to land very slowly and stops after an unusually short run. The TA-1 is a two-seater training airplane equipped with the 170 hp. Wasp ABC Air-cooled radial engine. It is the first military airplane which has been flown with the U.S.A. 27 wing curve, which has given remarkable results in the wind tunnel tests. With this wing section only one pair of struts on each side is required for bracing which greatly simplifies rigging and maintenance in the field. With the exception of the strut arrangement the general design of the airplane follows orthodox practice.

Civilian Aviation Petitions President

Leaders of Civilian Aviation Ask for Hearing on Air Policy

Over fifty aviation experts representing the leading aeronautic organizations in this country have requested President Harding to permit them to give to the Secretary of Commerce their views on government air policy as it affects civilian aviation. The Brief that went to the White House reads as follows:

A BRIEF

For the Advancement of Civilian Aviation in the United States

The undersigned, while acknowledging the efforts which have been made by governmental departments to evolve an aeronautical policy, feel, nevertheless, that neither the President nor Congress has received from civilian aviation outside these governmental agencies what it regards as most necessary for its immediate aid and future usefulness.

We therefore request the President to make available for general consideration the best opinions of civilian aviation experts not in the employ of the government. To do this it is earnestly recommended that he direct the Secretary of Commerce to appoint an Aviation Consulting Board or an Aviation Commission consisting of two civilian representatives from, and designated by, each of the following organizations:

(1)—Aero Club of America
(2)—Manufacturers Aircraft Association
} representing operation, design and construction.

(3)—National Aircraft Underwriters Association —representing insurance.

(4)—Society of Automotive Engineers
(5)—National Advisory Committee for Aeronautics
} representing technical

We suggest that this group be requested to present for the consideration of the President, through the Secretary of Commerce, a report dealing with the subject of civilian and commercial aviation, with particular reference to the following matters:

(1) The general policy which the government is to follow in developing civilian aviation.

(2) Suggestions for aerial law.

(3) Air routes and terminals.

(4) Any other aspects of aviation which the committee believes should be called to the attention of the President.

As this subject is now before Congress, we urge—if the above meets with the President's approval—that the committee be instructed to report at the earliest possible moment.

The Signatories

The above has been approved and signed by the following:—

Glenn H. Curtiss,
Garden City, L. I., N. Y.

Glenn L. Martin,
President, Glenn L. Martin Co., Cleveland, Ohio.

Frank H. Russell,
Curtiss Aeroplane and Motor Corp., Garden City, L. I., N. Y.

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National Aircraft Underwriters Association, By
Edmund Ely, President, New York.

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Harvey C. Senior,
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Aetna Casualty & Surety Co., By
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Ralph Upson,
Airship Engineer, New York.

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Albert P. Loening,
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Editor, AVIATION AND AIRCRAFT JOURNAL, New York.
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Governing Director, Aero Club of America, New York.
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Cecil B. DeMille,
President, Mercury Aviation Co., Los Angeles, Calif.
John H. Fisher,
Vice President, Aero Club of Southern California, Los Angeles, Calif.
C. F. Kettering,
Dayton Wright Co., Dayton, Ohio.
Virginius E. Clark,
Dayton Wright Co., Dayton, Ohio.
H. F. Emmons,
Detroit, Mich.
Henry B. Joy,
Detroit, Mich.

Aviation in the Far East

The following information on aviation developments in the Far East is taken from *The Far Eastern Review*:

Peking-Shanghai Aerial Service.—An aerial service between Peking and Shanghai was to be inaugurated June 1 next. The passage fare will be $200 for one single ticket and the postage for every letter will be 18 cents.

Aviation Station in Tsinanfu.—The aviation department is going to erect landing grounds and airdromes in Tsinanfu, the provincial capital of Shantung. Lands to the extent of 480 *mow* have been purchased by the deputies recently sent to investigate into the conditions of Tsinanfu. Merchants will be invited to build the required aviation station. It is anticipated that the aerial service between Peking and Tsinanfu will soon come to into existence. Offices for the aviation experts will also have to be built in Tsinanfu.

Japan Gets Airships.—Vickers, Limited, at Barrow-in-Furness have completed a number of airships of the scout class for the Japanese government.

Lu Yung-ting to Buy Airplanes in Macao.—In answer to the request from War-lord Lu Yungting for the supply of airplanes, Peking has instructed Lu to buy them from the Portuguese merchants in Macao but the machines will be taken over by Peking after the expedition against Kwangtung has been completed.

Conclusion of Seaplane Loan.—The *Shun Tien Shih Pao* is responsible for the report that the proposed seaplane loan concluded between the ministry of navy and British firms Heng Ta-li (Vrard & Co.?) andChia-chi Kungssu, the agreement having been signed on the 11th instant, and a sum of £400,000 having been handed over to the Chinese side. The amount of the loan is £897,200 for 105 seaplanes and expenses of constructing airdromes, with an additional sum of £400,000, totalling £1,297,200. Annual interest is 6 per cent, the loan to be redeemed in five years.

Big Airplane Factory to Be Established at Nagoya.—Mr. Winter representing Messrs. Armstrong & Co. of England is in Tokyo with nine mechanics specially selected by the British government, with a view to erecting the largest airplane factory in the Orient at Nagoya. Mitsubishi and other prominent Japanese firms are interested in the project. It is understood that the factory will turn out machines to be used for aerial mail service between Shanghai and Tokyo.

Aviation Station in Tsinan.—A tract of land between Kuanchiaying and Huangchiatun has been secured for the purpose of an aviation station in Tsinan, China. Tenders are being invited for the construction of the hangars.

Aeronautical Society Formed in Shanghai.—Shanghai residents are forming an aeronautical society with a qualified technical board with the object (1) of encouraging the development of aeronautics and (2) to undertake and control all flying competitions, sporting events and trials in Shanghai. The society will be affiliated to the International Aeronautical Association.

Locating Seals by Aircraft

Some interesting experiments in locating seals by means of aircraft have recently been made in Newfoundland, according to a letter received by the Aero Club of America from Captain J. Hamilton, Government House, St. John's, N. F. The letter reads as follows:

"In continuation of my letter of the 5th instant and connected correspondence I am now in a position to give you a certain amount of information concerning the recent experiment of locating seals in these waters by means of airplanes which I trust will be of interest.

"Early in the year the original contractor abandoned the enterprise, which was then taken up by Major F. S. Cotton. Renewal of negotiations greatly retarded progress with the result that the great bulk of materials and equipment did not arrive at the seat of operations until March 9.

"The base was established at Botwood on the north east coast and the first satisfactory flight was carried out on March 28. By this time the ice had broken and the ships began locating the seals which had been driven to some one hundred and fifty miles east of Botwood.

"Weather conditions during the winter have been unusually severe. There were a number of snow blizzards and a great deal of snow on the ice which was used as an airdrome. Climatic conditions caused several delays, but the troubles were eventually overcome and considerable valuable experience and data gained.

"The longest patrol was made on March 31 to a position of 50 deg. 30 min. N., 52 deg. 46 min. W., or a total distance out and back of over 300 miles. This patrol, which was cut short owing to the positions of the sealing steamers not being definitely known, was not sufficient to take the machine to the location of the seals. The range of vision was extremely large and the observer was of the opinion that here will be no difficulty in detecting seals if they are present. In addition to the pilot (Major Cotton) and the observer (Captain Kean) a second pilot (Captain Plaistowe) and wireless operator (Mr. Heath) were carried.

"During another trip from Botwood to Fogo and return extremely severe conditions were encountered including an 80 mile an hour gale. The airplane made the outward journey of 65 miles in 29 min., but took an hour and three quarters to return. Several shorter trips (totalling in all about 55 flights) were made along the coast and inland before the ice landing conditions prevented further flying on April 18.

"The lateness of starting operations prevented the actual securing of the object this year, but the progress made and information gained in the short time at their disposal seems to indicate great possibilities for success in the future should any further attempt be made. During the operations landing skis were successfully designed, fitted and used.

"The machines were the Westland Napier six-seater Limousine and Siddeley Puma De H. 9."

Flying for Business Reasons

A recent issue of the S.A.E. Journal quotes C. F. Kettering, vice-president of the General Motors Corp., as saying, "I made only two railroad trips last year; I flew more than 15,000 miles. I was not joyriding, but was at one place and wanted to go somewhere else, and traveled in an airplane.

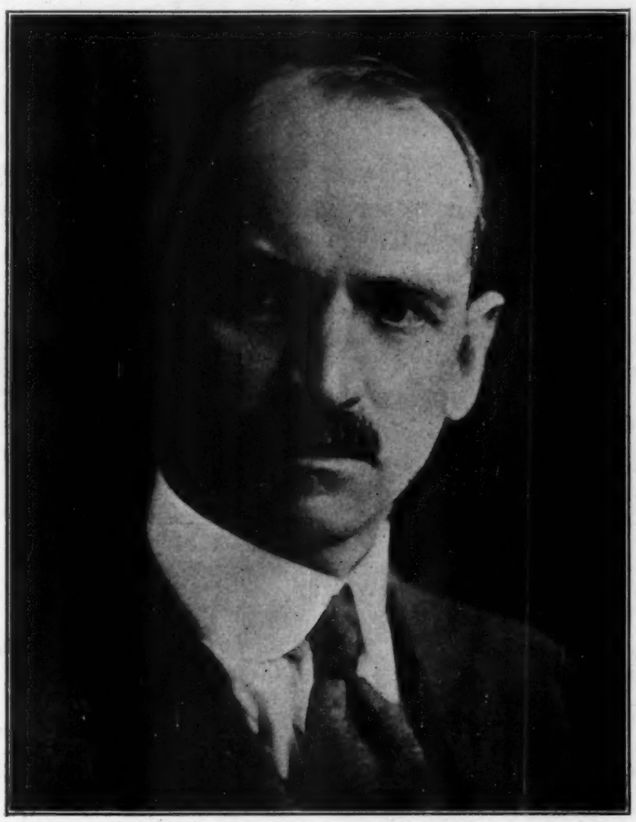
"The aircraft industry is here, and it will become a fundamental industry. The economic side of it is so fundamental and the commercial side is so tremendous that commercial organizations should awake to the fact that to reap commercial success they must contribute something to the fundamental research problems."

Glenn Hammond Curtiss

A Biography

Glenn Hammond Curtiss was born in Hammondsport, New York, May 21, 1878. He was the son of Frank R. Curtiss and Lua Andrews Curtiss. His paternal grandfather was a Methodist minister, who for many years preached in the little church in the picturesque little village at the end of Lake Keuka.

Almost from the time of his birth, Curtiss manifested a strong interest in mechanics. While yet a child, he was well known locally as an ingenious maker of odd contrivances. Tomato cans and wires, bits of machinery, everything of this character which came his way were used to make something. When at the death of his father, in his early childhood, his mother moved to Rochester, he entered as an apprentice the Eastman Kodak Company, where he acquired a knowledge of working with wood and small pieces of metal which later stood him in good stead in the manufacture of motors and airplanes.



GLENN H. CURTISS

Always on the lookout for some way to make money, with which to carry on his experiments, he filled in his time as Western Union messenger, and it is believed that he was the first to use roller skates, and later a bicycle for business purposes. He possessed a dominant desire to excel in speed, and soon became a well known bicycle racer.

Removing to Hammondsport again, he worked in a small bicycle repair shop, and finally became the owner of it. This business prospered, so that within a year he was able to open a branch store in Bath, and later one in Corning. During this period he continued to experiment with motorcycle motors, and at last produced one which very soon won him fame. He continued to enter and win races, and rapidly gained a reputation as a daring and persistent racer. He won the championship at the first meeting of the American Motorcyclists, at Yonkers, in 1905. In 1906, he established the world's record for single cylinder motorcycles, at Providence, Rhode Island, covering a mile in 56 2/5 seconds.

The following year, at Ormond Beach, Fla., he lowered this record by 2 seconds, by going ten miles in eight minutes and 54 2/5 seconds. This record stood for seven years. He then constructed a 40-hp., 8 cylinder motor, placed it in a motorcycle frame, took it to Ormond Beach, and made that wonderful record of, a mile in 26 2/5 seconds, equalling 137 miles an hour, even to this day unequalled.

In 1905, the G. H. Curtiss Manufacturing Company, which had been established in 1901, was incorporated for the manufacture and sale of Curtiss Motorcycles and accessories.

In 1907, attracted by Curtiss' knowledge of aeronautical motor design and manufacture, and his success in building experimental airplanes and dirigibles, Dr. Alexander Graham Bell invited Curtiss to enter the Aerial Experiment Association, comprised of Dr. Bell, Lieutenant Thomas Selfridge, F. W. Baldwin, J. A. D. McCurdy and Curtiss. "for the purpose of carrying on experiments relating to aerial locomotion, with the special object of constructing a successful aerodrome".

After numerous kite and glider experiments, under Curtiss direction, as motor expert and director of experiments of the Association, the G. H. Curtiss Manufacturing Company built the Red Wing, the White Wing, the June Bug and the Silver Dart, designed by the members of the Association, and Curtiss designed and built the motors for them. The first eight cylinder, Vee type air cooled and water cooled motors were used in the June Bug and Silver Dart respectively. The work of the Association was successful from the start, each machine proving capable of controlled flight. The Association developed the Aileron System of Control and Shoulder Yoke Control mechanism, and the progress in improvement and skill in flying by Curtiss and others was so rapid that in the unprecedented time of nine months from the date of the organization, the objects of the Association were realized in full, and Curtiss piloting the now historic June Bug, on July 4th, 1908, won the Scientific American Trophy for a flight of one kilometer straight away. The Silver Dart and other machines were built and flown by the Association in the remaining nine months of its life, each bringing the airplane nearer to its commercial adaptation.

Having achieved its object, the Association was dissolved in 1909, and Curtiss immediately engaged in the manufacture of airplanes at Hammondsport. The Aeronautical Society of America had previously placed with him an order for an airplane, the first order placed in the United States by a civilian body, and manufacturing was commenced on this order. Incorporating many of his own ideas, Curtiss produced that refined machine of the A.E.A. pattern, which became known as the Curtiss type of airplane, using ailerons as distinguished from wing warping employed by the Wrights, and the improved Curtiss type of control mechanism. The machine was successfully demonstrated by Curtiss at Morris Park Race Track, New York. An order was soon received from the United States Army.

With the demand for exhibition flights, a number of duplicates of the Aeronautical Society machine were made and flown by Curtiss. Equipped with a new eight-cylinder water-cooled motor, one of these machines was entered for the Gordon Bennett Speed Trophy, at Rheims, France. Curtiss won this international speed event, and achieved international fame for himself and his machine. Later he toured Europe, winning the principal events at Brescia, Italy, including the Tour de Brescia, for the fastest flight of fifty kilometers. While in Italy he carried as his first passenger, D'Annunzio, the poet.

Mr. Curtiss has License No. 1 of the Aero Club of America, and License No. 2 of the Aero Club of France.

Returning to America, he was met by a distinguished delegation from the Aero Club of America, which presented him with a gold medal.

Captain Thomas S. Baldwin, the well known aeronaut, convinced that Curtiss had in his light motor an ideal power plant for dirigibles and airplanes, came to Hammondsport and commissioned him to complete an engine for his use. The dirigible was finished, the engine installed and Curtiss and Baldwin made several successful voyages. The attention of the United States Government was drawn to this work, and the first dirigible contract was awarded to these co-workers. U. S. Dirigible No. 1 was completed on time, its test took place at Ft. Myer, Va., in the summer of 1905, Baldwin acting as pilot and Curtiss as engineer, meeting every specification, it was accepted as the first army dirigible.

Continuing his work in the development of aeronautical motors, Curtiss had re-designed his engines, incorporating the water-cooled principle, as distinguished from the air-cooled type hitherto used.

There was immediate demand for flying instruction, and Curtiss formed the Curtiss Exhibition Company, and for several years gave personal instruction, teaching many prominent army and navy and exhibition pilots, prominent among whom were Com. J. H. Towers, U. S. N., the commander of the NC Flight Expedition, Lieut. T. G. Ellyson, U. S. N., Captain P. W. Beck, U. S. A., C. C. Witmer, G. Lansing

GLENN H. CURTISS AFTER HE HAD MADE A MILE IN 26 2/3 SEC. AT ORMOND BEACH, FLA.

Callan, Beckwith Havens, Charles K. Hamilton, J. A. D. McCurdy, W. E. Doherty, Com. Patrick Bellinger, U. S. N., Com. Richardson, U. S. N., Lawrence Leon, Cromwell Dixon, Charles F. Willard, Charles F. Walsh, Lincoln Beachey, William Huff, W. B. Atwater and many other well known fliers.

At the beginning of the war these men and their students, many of whom were instructors in Curtiss Schools, formed the nucleus around which the United States Government built the American Air Service.

On May 29, 1910, Curtiss made his spectacular flight from Albany to New York, down the Hudson River, winning the New York World prize of $10,000. He covered this distance, 150 miles, in 2 hours and 51 minutes, making two stops, one at Poughkeepsie and one at Spuyten Duyvil.

Ever since 1908, Curtiss has been at work upon a water machine, first at Hammondsport and later at San Diego, labors which finally resulted in the invention of the original hydro-airplane, and the next year of the invention of the flying-boat. For these two achievements, Curtiss received the Aero Club of America Trophy in 1911 and 1912, respectively.

On February 23, 1911, he accomplished the first flight from land to water and from water to land, leaving the shore at San Diego, flying out over the waters of the bay, alighting and arising again and making a successful landing on the beach, in a specially equipped amphibious machine.

He and his men also made flights to and from warships, and both the U. S. Navy and U. S. Army began to take a great interest in his experiment, sending officers to his aviation school for special instruction in the art of flying these machines.

During 1911 and 1912, Curtiss and his students broke records and won prizes in all the aviation meets, carrying mail, demonstrating the military value by conducting bomb dropping tests, and establishing world's records for airplanes, hydro-airplanes and flying boats. In December, 1911, the Aero Club of America awarded Mr. Curtiss the Robert J. Collier Trophy, for the most signal advance in aviation during the year, namely the single-float hydroairplane. In December of 1911, the Curtiss Motor Company was formed to manufacture motors and motor parts, which were assembled in airplanes by the Curtiss Aeroplane Company.

In August 1912, Curtiss made his second trip to Europe, and as a result secured a number of contracts with foreign governments. In February, 1913, Mr. Curtiss was commissioned by Rodman Wanamaker to construct a trans-Atlantic flying boat, to be piloted by J. C. Porte of the British Royal Navy. This boat was partially completed at Hammondsport at the time the war began, in August, 1914. The trans-Atlantic flight was abandoned, but the America ordered for war purposes was sold to the British government, and formed the basic design for a quantity of such flying boats which were built by the Curtiss Company, and in England for the British Royal Navy.

It was about this time that the Smithsonian Institute through its Secretary, Dr. Walcott, and the well known aeronautical engineer Charles M. Manly, believing that Samuel P. Langley, the former secretary of the Institute and an early and persistent investigator of aerial theories, had in the Langley machine designed and built an airplane capable of successful flight, asked Mr. Curtiss to take the machine to

AN EARLY CURTISS SEAPLANE: THE "FLYING LIFE BOAT"

Hammondsport, equip it with pontoons and fly it. This he did, and not only demonstrated that the original machine, with its original motor was capable of sustained flight, but also proved that even with additional pontoon weight of 300 pounds the machine was thoroughly practicable and capable of doing well that which its inventor had said it would do.

On May 6th, 1913, for the successful development of the hydroairplane and flying boat, the Langley Medal, presented at the Smithsonian Institute, Washington, D. C., was awarded to Glenn H. Curtiss. In 1916, the Curtiss Aeroplane & Motor Corporation, with a capitalization of $9,000,000, which eventually included nine plants and five flying stations, was organized. Even before the beginning of the great war, several of the foreign governments had asked for designs for military planes, hydroairplanes and flying boats, and the plants were soon occupied in building war types; at first for some foreign countries, later almost entirely for England. With the entrance of the United States, still larger plants were added.

Augmented by the demand of the great war, the number of different models of airplanes, seaplanes and flying boats that were invented, designed or built by Mr. Curtiss and his associates reached the amazing total of 200. Of this total one hundred and forty different models were actually constructed, successfully operated, sold and used,—in the majority of instances for military purposes. Approximately thirty of them saw military or naval service in Canada, Great Britain, Italy, Russia and the United States during the World War. About eighty of these two hundred models have been distinctly different designs, differing basically as to kind, type or class, that is they were not redesigns, substitutes or rearrangements, but models showing individual characteristics.

Training planes were produced in large numbers, and the Curtiss JN-4 was a familiar sight on all training fields in this

country and in Canada, where another plant, located in Toronto, was producing the Canadian type of plane.

At the end of the war, it was decided to concentrate activities at the Garden City plant. Here the NC transatlantic boats were built, and it was from this plant that a number of the new commercial types were produced, including the Curtiss Oriole, the Curtiss Seagull, the Curtiss Eagle, the new ten passenger plane, the Wasp and the Hornet, the former of which holds the world's altitude record. A number of other special designs for commercial and mail service are now in the process of development. Mr. Curtiss is still actively engaged in the inventing, designing and development of advanced types of aircraft.

Prizes and Medals Won by Glenn H. Curtiss

Date:	Prize:	Event:	Donor:
May 30, 1902	Silver Loving Cup and Gold Medal	Motorcycle Road Races	New York Motorcycle Club
May 30, 1903	Gold Medal	Hill Climbing Contest	"
May 30, 1903	Championship Medal	N.C.A. Championship	
Aug. 3, 1904	Highest Award for Aeronautical Motors	St. Louis Exposition	
Summer of 1905	Highest Award Curtiss Motorcycles	Endurance Contest	
1906	Highest Award Curtiss Motors	The Lewis & Clark Exposition, Portland, Oregon	
1907	Diamond Medal and Highest Award	F.A.M. National Endurance Run & Hill Climbing Contest	
July 4, 1908	Scientific American Trophy	Longest Public Aeroplane Flight to Date	Scientific American
July 17, 1909	Scientific American Trophy	Award for 24.7 miles or 19 circuits Hempstead Plains	Scientific American
1909	Cortland Field Bishop Prize	To first of four persons to fly one kilometer	Cortland Field Bishop, through Aero Club of America
Aug. 29, 1909	The Gordon Bennett Cup-$5,000 Cash	World's Speed Contest	James Gordon Bennett
Sept. 1909	The Grand Prix Passenger Prize Awarded-7,000	Brescia, Italy. Fastest Flight of 50 Kilometers	
Sept. 1909	Gold Medal	In recognition of Mr. Curtiss' achievements	Aero Club of America
Jan. 17, 1910	Los Angeles Meet Cash prizes-$6500	Speed, Endurance & Time, Fastest Lap—Quickest start from first motor explosion	
Apr. 25, 1010	W. E. Kelly Cup	The World's Quick Start Record, San Antonio, Texas	
May 29, 1910	N. Y. World Prize Cash $10,000	New York to Albany Aeroplane Flight—World's Record for distance	New York World
July 4, 1910	Atlantic City Aeronautical Meet-$5,000 Cash Prize	First to accomplish a fifty mile flight over the ocean	
1911	The Robert J. Collier Trophy	For the most signal event in aviation during the year, the hydroaeroplane	Robert J. Collier
Jan. 1912	Aero Club of America Trophy	Development of the Hydroaeroplane—The greatest advance in aviation in 1911	Aero Club of America
Jan. 1913	Aero Club of America Trophy	Development of the Flying Boat The Greatest advance in Aviation in 1912.	Aero Club of America
May 6, 1913	The Langley Medal	For successful development of the hydroaeroplane and flying-boat	Smithsonian Institution, Washington, D. C.

Patents Issued to Glenn H. Curtiss

1. Flying Machine—
   The Aileron System of Control, the shoulder yoke and wheel control, steering wheeled landing gear (Patent to Bell, Baldwin, McCurdy, Selfridge & Curtiss of Aerial Experiment Association).
2. Means of launching flying machines.
3. Controlling Mechanism for Flying Machines and the like—A dual control mechanism.
4. Flying machine. Control mechanism shiftable from one operator to another.
5. Flying Machine—Adjustable Wings.
6. Flying Boat—The original flying boat.
7. Heavier than air flying machine—Thrust distributing system.
8. Hydroairplane—Thrust distributing system, hydroplaning system, sectional boat, built in wings.
9. Hydroairplane—The original hydroairplane.
10. Flying machine,—Differentially acting lateral controls.
11. Exhaust Heater for Air Inlets.
12. Hull for flying boats—Lateral planing bottom extension types.
13. Landing gear for aircraft—Tandem wheels, equalizer type, shock absorbing system.
14. Multiple control system for Prime Movers—Control system for Multiple Motor Units.
15. Folding Wing Airplane.
16. Boat Hull—For Flying Boats.
17. Flying Boat Hull—General Construction.
18. Multiple Step Flying Boat.
19. Propeller.
20. Method and System for Operating Rudders of Aircraft.
21. Hydro Aero Machine—Streamlined Pontoons.
22. Flying Machine—Multimotored, Fighting Type.
23. Flying Boat—General Construction.
24. Flying Boat—Planing Surface Form.
25. Balancing System for Aircraft—A system of lateral and directional control.
26. Hydroplane Boat.
27. Airplane—Fuselage and Landing Gear Constructions.
28. Flying Boat—Multimotored, Bombing type, Vee Brace Interwing Motor Suporting Systems, Built in Wing Panels, Thrust Distributing System.
29. Boat Type Wing Pontoon.
30. Draft System for Flying Boats.
31. Flying Boat Hull—Improved Planing Surface Forms.
32. Landing Gear for Aircraft—Tandem Wheel Type for larger machines.
33. Hydroairplane Boat—The original "America" type of flying boat.
34. Hydroairplane Pontoon.
35. Convertible Running Gear—The original land and water operating machine. A hydroairplane with extensible and retractible landing wheel gear.
36. Flying Boat Cruiser—A cabin type cruising motor boat with wings.
37. Valve operating system—For four-valve-in-the-head motors.
38. Tilting Wing Flying Boat.—Wing tilted in lieu of boat on launching and landing.
39. Flying Boat—Empennage Construction.
40. Twin Fuselage Construction—The original multimotored Twin Fuselage Machine, Controls for the same.
41. Autoplane—An automobile with wings.
42. Hull for Flying Boats—Sea Going Type.
43. Flying Boat—Sea going type with sheddable wings, Power plant in hull, Auxiliary power for cruising.
44. Airplane Construction—For flying boat, Empennage and wing arrangements.
45. Hydroaircraft—A self launching hydroairplane.
46. Airplane Landing Gear—For light reconnaissance machines.
47. Twin Float Hydroairplane.
48. Airplane Wing Truss—For quadruples and other multiplanes.
49. Combination Landing Gear for Airplanes—A land gear provided with Hydro surface to permit landing on water.

50. Cruising Hydroairplane—Intercoupled power plants in both hull and wings.
51. Retractible Water Propeller.—Triplane Speed Scout, a triplane with biplane wiring.
52. Speed Scout Airplane.
53. Folding Wing Airplane.
54. Reconnoitering Airplane—A biplane without interwing wiring.
55. Fuel Supply System.
56. Lubricating System for Traveling Motors—The Original Dual Pump Crankcase Drainage System.
57. Flying Boat Hull—Constructional Features Greater Seagoing Types, Sectional Side Planing Fins.
58. Flying Boat Construction—Constructional Features Multimotored Seagoing Type.
59. Airplane Wing Structure Truss.
60. Hydroaircraft—A flying boat having supplemental planing surface of the Hydrovane type.
61. Tripod Flying Boat—A multimotored super-flying boat having triplane wings and a triple boat water base.
62. Airplane Tilting—A universal type wing post and fuselage strut socket.
63. Hydro Aero Machine—"NC" Trans-ocean Type Flying Boat, Empennage Construction.
64. Airplane Wing Construction.
65. Aileron Braking System—In which the Ailerons are operated to constitute a resistance brake for checking speed.
66. Airplane Construction.
67. Triplane—Multimotored Seagoing Type.

Aerial Derby of the American Legion

The Flying Club of Kansas City has undertaken to carry out the aviation program of the American Legion National Convention to be held there from Oct. 31 to Nov. 2.

A large appropriation has been made for the project, and manufacturers, as well as individual and group owners of aircraft, will be asked to enter machines in the Legion Derby and numerous trophy contests. In addition to this, Air Service squadrons are being asked to demonstrate formation flying, stunting, dropping by parachute, and night flying.

The opening of the Convention will inaugurate the operation of a municipal landing field equipped to supply the needs of aircraft praticipating in the program. The Convention will be the first big rally of ex-service fliers, and they are invited to make the club their headquarters while in Kansas City.

Advertising Tires by Airplane

Great ingenuity in advertising is being shown by the Chas. A. Fisher Co. of Cincinnati which uses an airplane for the purpose of calling attention to the merits of Lee Tires. The machine, which has been in operation since April is painted in such a manner as to leave no doubt of its identity in the minds of observers.

The plan followed by the pilot and salesman is to approach a town at a low altitude to attract attention, and then drop pamphlets extolling the virtues of Lee Tires. A landing is then made as near as possible to the town, and when a sufficient crowd has gathered business is commenced. If the salesman finds it necessary to go into the town to do business, the pilot utilizes the time by carrying passengers. Thus the advertising continues while business is transacted.

Needless to say much publicity is secured in this manner and the company reports that advertising by airplane pays.

U. S. Civil Service Examination

The U. S. Civil Service Commission announces an open competitive examination for the position of Airplane Pilot in the Air Mail Service at a base salary of $2,000 a year with additional pay on mileage basis; and for the position of Flight Test Observer for a vacancy in the Engineering Division, Air Service at Large, at from $2,000 to $3,000 a year.

Applications will be received until July 5, 1921. Further information may be had from the U. S. Civil Service Commission, Washington, D. C.

Who Forgot an Airplane?

That anyone should actually be capable of forgetting an airplane may seem incredible. Yet the thing has been done, as may be seen from the story which follows—and which is authentic.

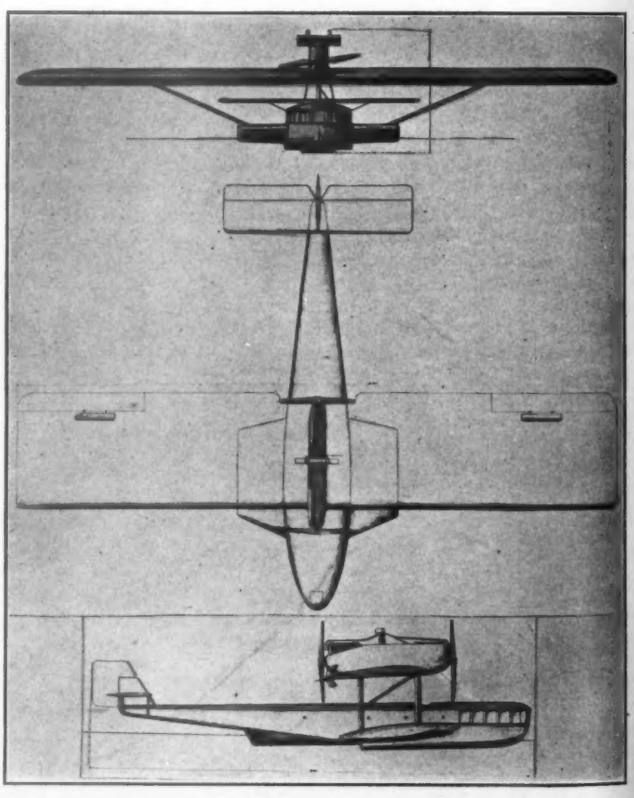
About a year ago a black JN flew into the airdrome of the Dayton-Wright Co., at Dayton, Ohio. It carried two men who inquired whether they might leave their machine on the field for a day or so, and stated that they would return for it in

A Mysterious "Jennie"—The Airplane Somebody Forgot

that length of time. That was the last the airdrome saw of the two men. Inquiries as to who might be the owner of the bus proved without avail and nobody ever put in a claim for it. As the machine takes up valuable space, the Dayton-Wright Co. would like to hear from its owner, who should claim it without delay, else the JN will be disposed of for the payment of storage charges.

The accompanying illustration of the mysterious "Jennie" seems to show that it is of rather ancient vintage, belonging apparently to the JN-4B type. The following inscription appears on the sides of the fuselage: Marshall-Palmer Air Service, Frank Palmer, Pilot.

An Interesting Flying Boat



Three-Dimensional Views of the Dornier G.S.II Flying Boat, Described in our Issue of June 6, 1921

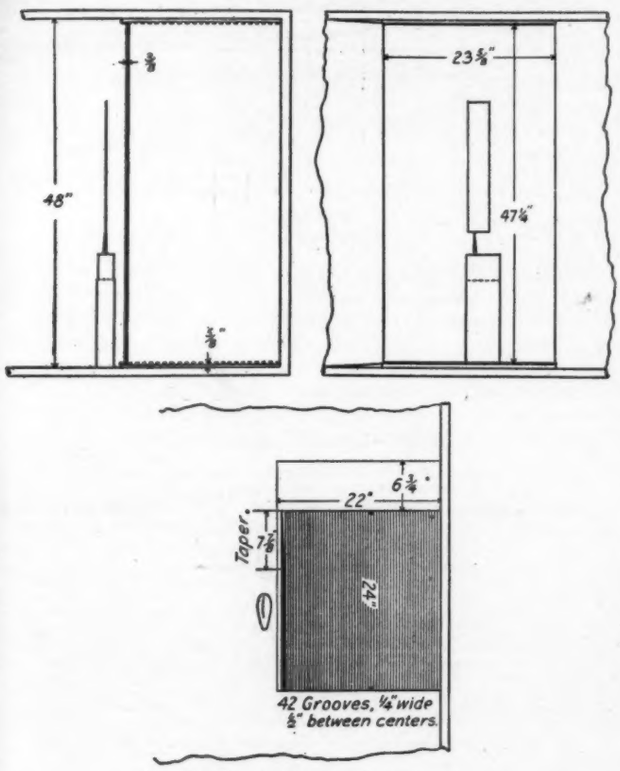
Ground-Plane Influence on Airplane Wings *

By A. F. Zahm, Ph.D., and R. M. Bear, B.S.

Bureau of Construction and Repair, U. S. N.

Preface.—As the air action on the wings of an airplane may change materially, for a given speed and poise, when the craft leaves or approaches the earth's surface, the nature of this change has been deemed worth investigating with a model in the wind tunnel. A test made on a single British R.A.F.6 aerofoil at 40 miles an hour in the 4 0 x 4 ft. tunnel, at the Washington Navy Yard, is described in this article. The model was made of brass and measured 3 x 18 in.; it had the form of profile shown in Fig. 5.

Method of Measurement.—Fig. 1 shows the apparatus for the test assembled in the 4 0 x 4 ft. tunnel. The aerofoil is held as usual at the extremity of the tapering spindle of the



Aerofoil and ground-plane in 4 x 4 foot tunnel.

FIG. 1

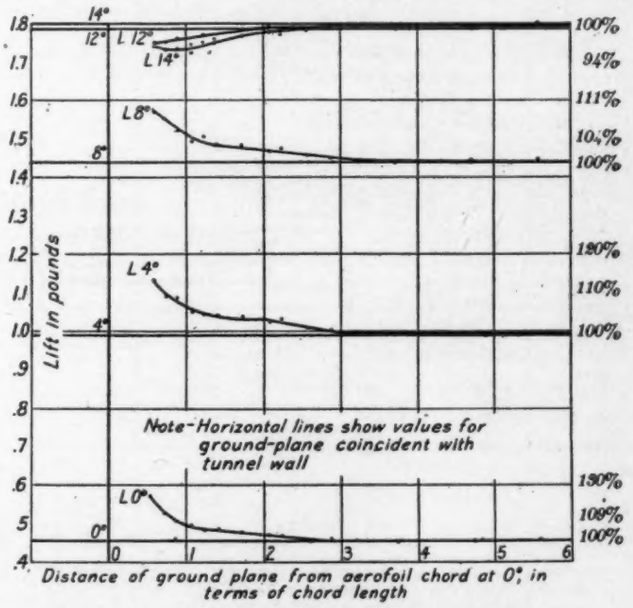
cross-arm wind balance, and has at one side a "ground-plane" parallel to the walls of the tunnel and held at its top and bottom edges in two grooved planks as shown. The plane, made of ⅜ in. laminated pine, is about two feet wide along stream and chamfered to a thin edge on the side remote from the aerofoil. The guide boards are grooved for a distance of two feet, then chamfered up stream to edges flush with the floor and the ceiling. The grooves are ¼ in. wide and spaced ½ in. between centers; and each indicates the distance from the nearest face of the plane to the chord of the aerofoil of zero pitch.

For each setting of the ground-plane, the lift, drag, and pitching moment was measured in the usual way at 40 m.p.h. and 0 deg, 4 deg., 8 deg., 12 deg., and 14 deg. pitch. In successive settings the ground-plane was moved laterally, by increasing steps, up to 16½ in. then removed from the tunnel or set over against its wall; this farthest displacement being about the equivalent of removing the plane entirely, when allowance was made for the change of cross-section of the tunnel due to such removal.

Values of Lift and Drag.—The measurements of lift and drag are not tabulated but are plotted to ample scale in Figs. 2, 3, 4.

For all angles of incidence, as should be expected, the graphs of lift, drag, and lift-drag curve less and less rapidly as the ground-plane shifts from about half a chord length successively to greater distances from the aerofoil. They each tend to approach asymptotically a horizontal line which marks, for the represented quantity, the value obtained with the ground-plane indefinitely distant.

The curves are roughly exponential and may be expressed in the form $y = a + b\,c^{-ex}$, where a is the asymptotic value, $a + b$ the initial value, x the ground-plane distance, c the coefficient of decay of the ground-plane influence. The dotted



Lift *versus* ground-plane distance "*below*" aerofoil. Air speed 40.3 m. p. h.

FIG. 2

lines in Fig. 4 are true exponential curves and coincide with the actual plotted data to within the degree of precision of the measurements. The numerical equations were derived from straight-line graphs of the data plotted on semi-logarithmic paper.

As the pitch increases from its smallest value 0 deg., up to near the burble incidence, the lift falls, and the drag rises with enlarging gap between the aerofoil and the ground-plane; also for these conditions the curves are further separated from their asymptotes initially and reach practical contact with them further from the origin. The asymptotes in all cases were hurriedly found from a single measurement, and in some instances seem to be less trustworthy than the curve approaching them.

As the pitch approaches the burble angle the ground-plane effect diminishes roughly to 0, then becomes increasingly negative as far as the test discloses.

The numbers on the right-hand side of Fig. 4, at the top, indicate that the efficiency of a monoplane wing closely skimming the earth's surface may be increased 20 or 30 per cent at

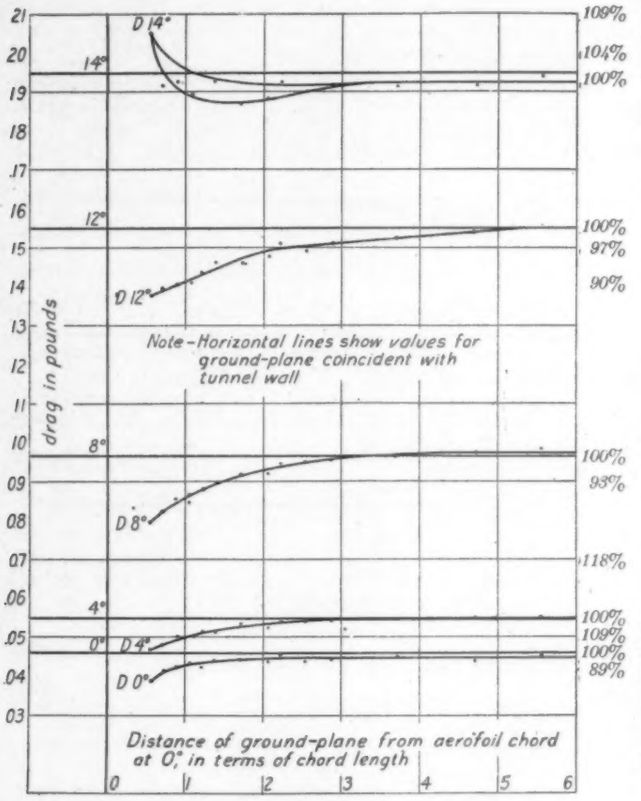
* From *The Journal of the Franklin Institute.*

4 deg. incidence. A still higher efficiency is indicated by the lift-drag curves for smaller angles of incidence.

From Figs. 2 and 4 it appears that at small incidences a monoplane is considerably better sustained and more easily propelled near a ground-plane than when two or three chords above it. This fact might be turned to account in navigating above smooth water. It is distinctly marked by the pilot in trying to land at too high a speed on a flat surface. The airplane tends to rebound as if striking a denser medium.

A complete set of readings also were taken with the ground-plane "above" the aerofoil, that is opposite its more chambered surface. The most striking features of these readings are the great increase of lift with increasing incidences up to 12 deg., and the considerable increase of drag with proximity of the ground-plane at all the incidences used, that is, from 0 deg. to 14 deg. The data were taken rather for completeness than for their practical importance, and hence are not given here.

Pitching Moment and Center of Pressure.—From the measured lift, drag and pitching moment at 0 deg., 4 deg., 8 deg. 12 deg. and 14 deg. incidence, the center of pressure was computed



Drag *versus* ground-plane distance "*below*" aerofoil. Air speed 40.3 m. p. h.

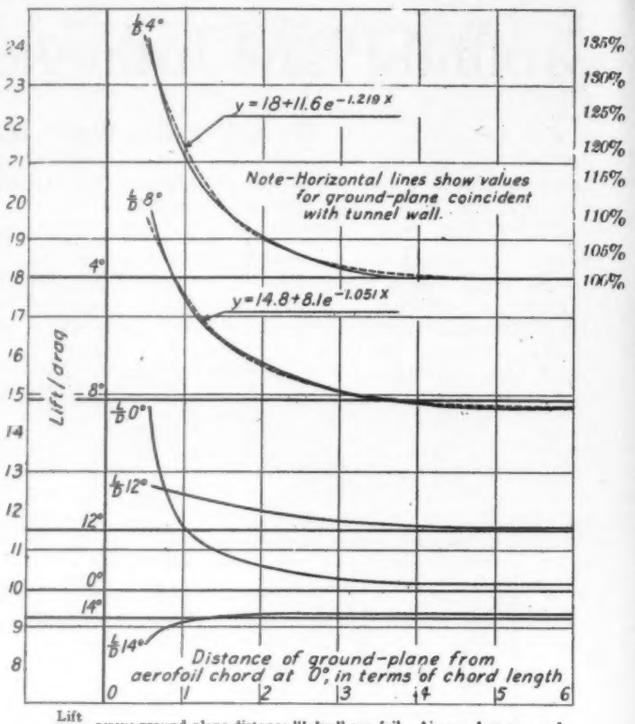
FIG. 3

with the gap fixed first at one-half the wing chord, then successively at larger fixed distances. The travel of the center of pressure is given in Fig. 5 and shows but slight ground-plane influence.

Reference.—On completion of this article the writers' attention was called to an account, in the *Ace* for December, 1920, of a test by Mr. A. A. Merrill, of the ground influence on a biplane model at the single angle of incidence of 13 deg. He observed at this angle a slight ground effect and shift of the center of pressure. He concludes: "This experiment then seems to show that the correction for ground effect upon landing is small though not negligible."

Dr. A. Betz reports,* for lift and drag only, the ground influence on a curved zinc plate to be quite similar to that found in the present test of a regular wing form. His model measured 10 x 60 mm., and was tested in a tunnel about two meters square in cross-section.

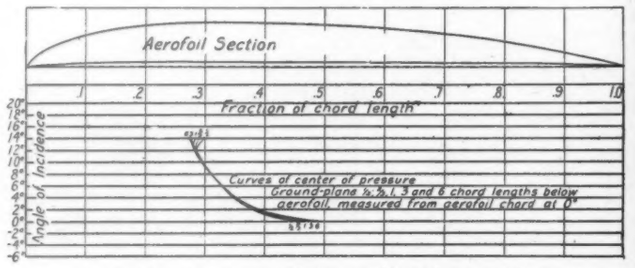
* *Zeitschrift fur Flugtechnik und Motorluftschiffahrt*, 1912.



Lift / Drag *versus* ground-plane distance "*below*" aerofoil. Air speed 40.3 m. p. h

FIG. 4

Summary.—The present study discloses a very material ground-plane influence at small incidence and ground gap. The lift is augmented, the drag diminished; the lift-drag may be increased 30 to 40 per cent. Thus a sea gull or a suitably designed monoplane may skim the surface of smooth water with considerably greater economy than it can fly at a few wing depths aloft. But the pitching moment is only slightly affected by the presence of a ground plane.


Aerofoil Section
Fraction of chord length
Angle of Incidence
Curves of center of pressure
Ground-plane ½, ¾, 1, 3 and 6 chord lengths below aerofoil, measured from aerofoil chord at 0°

Aerofoil section and centre of pressure. Air speed 40.3 m. p. h.

FIG. 5

New Naval Seaplane

A new type of naval seaplane is undergoing tests at the naval air station at Rockaway, Long Island. No official announcement as to the characteristics of this machine has so far been issued, but from accounts of eyewitnesses who saw the machine taxying off shore it appears to be a twin-tractor float type monoplane. Judging by the sound of the engines, of which there are two, mounted on the wing, these are Wright types. The *New York World* supplements the information by stating that they are 300 hp. models and that the maximum speed of the machine is 110 knots, or 132 m.p.h.

An interesting feature of the machine is its very thick wing section, which an experienced eye recognizes from afar. According to the *World*, the machine is intended for torpedo or bomb carrying and was built by the Curtiss Aeroplane & Motor Corp. Further details of this new seaplane will be awaited with interest.

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

Rexford Byrde Levisee

LEVISEE, REXFORD BYRDE, Air Mail Pilot; born, Clintonville, Wis., May 10, 1888; son of W. W. Levisee and Martha (Chandler) Levisee.
Educated: Grammar and high school, Clintonville, Wis.
Professional: 1906-1909, Civil Engineering (field) North Side Land and Water Co., Twin Falls, Idaho; 1910-1917, Automobile Business.
Aeronautical Activities: Dec. 29, 1917- Feb. 18, 1918, primary flying school, Rockwell Field, San Diego, Calif.; Feb. 18, 1918-April 1, 1918, Supply Officer, 676 Aero Squadron Supply, Camp Dick, Dallas, Tex.; April 1, 1918-Dec. 8, 1918, primary flying instructor, Eberts Field, Lonoke, Ark.; occasional flying as Reserve Officer since armistice at Army Fields.
Flying Rating: Reserve Military Aviator, Feb. 18, 1918.
War Service: School of Military Aeronautics, University of Calif., Berkeley, Calif., Cadet, Sept. 20, 1917 to Nov. 24, 1917. Commissioned.
Member: Aero Club of America.
Present Occupation: Pilot, Air Mail Service, Salt Lake-San Francisco Division.
Address: Air Mail Service, Reno, Nev.; home, 350 Lenox Ave., Oakland, Calif.

Henry C. K. Muhlenberg

MUHLENBERG, HENRY C. K., Major, Air Service; born, St. Louis, Mo., Nov. 6, 1886; son of Gen. J. A. Kiess, (retired) and Lydia Homet, married, Helen M. Dorrington, July 1909.
Educated: Public schools; Omaha High School, Omaha, Nebr.; U. S. Military Academy, 1908; School of Musketry, Monterey, Calif., 1910; Watertown Arsenal, 1914.
Professional: Entered army as 2nd Lieut., 1908; promoted to 1st Lieut., Inf., 1913; Capt., Inf.; 1917; Major, Signal Corps, 1917: Lt. Col.. Air Service, 1918; Major, J. M. A., Feb. 1920; Major, Air Service, 1920.
Aeronautical Activities: Detailed to Aviation Section, Signal Corp, Dec. 1917; sent to San Diego, Calif. for flying instruction.
Flying Rating: Junior Military Aviator, March 16, 1918; Airplane Pilot, July 3, 1920.
War Service: In charge testing dept. Technical Section, Air Service, May to Sept. 1918, Wilbur Wright Field; in command Armorers' School, Air Service, Fairfield, Ohio, Sept. 1918 to Jan. 1919; in charge Material Section, Engineering Division, Air Service, McCook Field, Jan. to May 1920; in command Rich Field, Waco, Tex., May to Dec. 1920; in charge of Air Service, R. O. T. C. unit, University of Washington, Seattle, Wash., to date.
Present Occupation: Asst. Prof., Military Tactics, R. O. T. C., University of Washington;
Address: University of Washington; home, Fort Lawton, Seattle, Wash.

Charles Edward Lucke

LUCKE, CHARLES EDWARD, Prof. of Mechanical Engineering, Columbia University; born, New York City, June 20, 1876; son of John Franklin Lucke and Sarah Frances Lucke; married, Ida Marguerite Becker, 1904.
Educated: Public schools of New York City; C. C. N. Y.; N. Y. U.; Cornell; Columbia; B. S., 1895; M. S., 1897; Ph. D., 1902.
Professional: Professor of Mechanical Engineering, Columbia University, New York City and head of dept.; joined dept., 1902; Consulting Engineer since 1902.
Aeronautical Activities: Student of Aviation Engines and investigator since beginning; organized and directed U. S. Navy Gas Engine School during War, for training all naval aviation maintenance force and aviation engineer officers.
War Service: Directed U. S. N. Gas Engine School from Sept. 4, 1918 to March 17, 1919; commissioned Lt. Com., Sept. 4, 1918; cited in annual report of Secretary of Navy, Jan. 1919.
Member: Columbia University and Engineer's Club; Society of Automotive Engineers; Society N. A. and M. E.; Columbia Post of American Legion.
Present Occupation: Prof. of Mech. Eng., Columbia University; Consulting Engineer.
Address: Columbia University; home, 544 West 142nd St., New York City.

Irving Pemberton Corse

CORSE, IRVING PEMBERTON, Rancher; born, Minneapolis, Minn., Dec. 19, 1896; son of Irving L. Corse and Susan Evelyn Corse; married, Angela Ritchie Nalle, April 30, 1920.
Educated: Blake School, Minneapolis, Minn.; Phillips Academy, Andover, Mass.; 1919, Certificate of Honor, Yale.
Professional: Ranching since 1919.
Aeronautical Activities: S. of M. A., Champagne, Ill., Aug. 29, 1917; flying training, Canada, Oct. 20, 1917 to Dec. 2, 1917; flying training, Texas, Dec. 2 to Jan. 7, 1918; commissioned 2nd Lieut., Jan. 12, 1918; sailed overseas, Feb. 26, 1918; advanced flying in England; to France and 84th Squadron R. A. F., July 17, 1918; Sept. 5, 1918, wounded in action over Athies, southeast of Peronne, on S. E. 5; Sept. 9, 1918, transferred to 17th U. S. Aero Squadron, on camel, admitted to No. 21 General Hospital, B. E. F. Camiere, France, Sept. 13, 1918 and several more in England and the U. S.; discharged, Jan. 11, 1919, Garden City, L. I., N. Y.
Flying Rating: Reserve Military Aviator, Jan. 12, 1918.
War Service: Aug. 29, 1917 to Jan. 11, 1919; Aug. 25, 1918, 1 Rumpler 2 seater destroyed, in flames; Sept. 7, 1918, 1 balloon destroyed, in flames.
Member: American Legion.
Present Occupation: Ranching.
Address: Bar B. C. Ranch, Teton Post Office, Jackson's Hole, Wyo.

Frederick Henry Harris

HARRIS, FREDERICK HENRY, Broker; born, Brattleboro, Vt., Sept. 8, 1887; son of Charles Adrian Harris and Lizzie (Morris) Harris.
Educated: Brattleboro High School; B. S. 1911, Dartsmouth College.
Professional: Bond Salesman for Baker, Ayling and Young, Boston, Mass., 1912 to 1917; April to Oct. 1919, handling Army and Navy contracts as Washington representative for Curtiss Aeroplane and Motor Corp.
Aeronautical Activities: Gallaudett Aviation School, Nov. 1917; Curtiss Aviation School, Miami, Fla., Jan. to April 1918; Naval Aviation Detachment, M. I. T. Cambridge, Mass., May to Aug. 1915; Naval Air Station, Bay Shore, L. I., Aug. to Sept.; Naval Air Station, Hampton Rds., Va., Sept. 8 to 15; Naval Air Station, Pensacola, Fla. to Feb. 12, 1919; Chairman, Student Council Battalion Commander at Pensacola.
Flying Rating: Naval Aviator; Aviator's License, Aero Club of America.
War Service: Ensign, Naval Reserve Flying Corps.; instructor on flying of H-16 flying boat 2 Liberty motors; in charge of all student officers at Naval Air Station (320 Student Officers) Pensacola, Fla.
Books: "Dartmouth Out O' Doors", 1913; Book on Winter Sports.
Member: Aero Club of America.
Present Occupation: Broker.
Address: 220 Barber Bldg., Brattleboro, Vt.

Clyde Henry Butler

BUTLER, CLYDE Henry, Maps; born, Stark County, Ohio, May 4, 1895; son of Ira Newton Butler and Catherine (Albrecht) Butler.
Educated: Jackson Twp. Schools; Canal Fulton High School; Capital University, two years; Ohio State University, two years, 1919.
Professional: Goodyear Tire & Rubber Co., 1919; sold typewriters, Jan. to April 1920; Aerial Transport Corp., April to Aug. 1920; Floyd J. Logan Aviation Co., Aug. to Oct. 1920; Corlett Aero Map Co., Oct. to present time.
Aeronautical Activities: U. S. Air Service, Nov. 1917 to Feb. 1919; Aerial Transport Corp., non flying; Floyd J. Logan Aviation Co. as pilot and salesman; from Oct. 1920 to present time, in charge of flight and photography for Corlett Aero Map Co.
Flying Rating: Military Aviator.
Member: Cleveland Aviation Club; Aero Club of America.
Present Occupation: Manager, Aerial Department, Corlett Aero Map Co.
Address: 940 Leader News Bldg., Cleveland, Ohio; home, R. F. D. No. 3, Massillon, Ohio.

Franklin Otis Carroll

CARROLL, FRANKLIN OTIS, 1st Lieut., U. S. Air Service; born, Washington, Ind., Feb. 10, 1893; son of Rev. Ewin T. Carroll and Lillie May (Baldwin) Carroll; married, Clara Kathleen Carney, Nov. 26, 1919.
Educated: Public schools, Grayville, Ill. and Benton, Ill. High School; B. S. in Railway Electrical Engineering, University of Illinois.
Professional: Ohio Electric Railway Co., Columbus, Ohio, 1916.
Aeronautical Activities: Cadet, U. S. Air Service, Signal Corps, July 1917 to Jan. 1918; instructor in flying, 1919; commissioned 1st Lieut., Jan. 24, 1918; in charge of Municipal Landing Field Section, Office Chief of Air Service, Washington, D. C., Nov. 1919 to Sept. 1920; courses in Aero. and Radio Engineering, Mass. Inst. of Tech., 1920 and 1921.
Flying Rating: Reserve Military Aviator, Dec. 22, 1917; Airplane Pilot.
War Service: Air Service, July 22, 1917 to date.
Books: Co-Author with Mr. Geo. S. Wheat, Wright Aero Co., "Municipal Landing Fields and Airports", 1920.
Present Occupation: Army Student, M. I. T.
Address: Mass. Inst. of Tech., Cambridge, Mass.; home, 29 Queensberry St., Boston, Mass.

Robert Sam Yarborough

YARBOROUGH, ROBERT SAM, Power Engineer; born, Farmers, N. C., April 22, 1895; son of Whitson B. Yarborough and Martha Jeanette Yarborough; married, Sue Webb, Nov. 23, 1919.
Educated: High schools, Lexington, N. C.; three years, University of North Carolina.
Professional: Automobile business 1915-1917; District Mgr., Georgia Alabama Power Co., 1920-1921.
Aeronautical Activities: Ground School, Ga. School of Tech., 1917; flying training, Kelly Field, Nov. 1917; commissioned 2nd Lieut. Jan. 1918; instructor, Kelly Field, Jan. to April 1918; instructor in all stages at Belleville from April 1918 to March 1920.
Flying Rating: Recommended for pursuit pilot.
Present Occupation: District Mgr., Georgia Alabama Power Co.
Address: Eufaula, Ala.; home, Albany, Ga.

Don Gardner

GARDNER, DON, Merchandise Business; born, Syracuse, Nebr., May 25, 1896; son of Edward V. Gardner and Dora (Andrus) Gardner.
Educated: Grade schools in Colorado and Kansas; Pittsburg, Kans. High School, 1913; University of Kansas, 1916-1918.
Professional: Civil Engineering two years; retail automobile and accessory business.
Aeronautical Activities: Attended school for aerial observers, 1919; commissioned 2nd Lieut. Oct. 14, 1918.
Flying Rating: Airplane Observer.
War Services: 1st O. T. Camp, Ft. Riley, Kans., 1917; S. M. A., Urbana, Ill., 1918; discharged, Jan. 14, 1919.
Present Occupation: Wholesale Grocery, Winfield Wholesale Grocery Co.
Address: 6th and Main Sts.; home, 215 E. 10th St., Winfield, Kans.

Robert Edward Dake

DAKE, ROBERT EDWARD, Airplane pilot; born, Chicago, Ill., Jan. 25, 1895; son of Edward J. Dake and Claribel (Van Riper) Dake.
Educated: Public and high schools of Waukegan, Ill.; B. A. 1921, Carnegie Institute of Technology.
Aeronautical Activities: Chief Pilot, Kenney Aircraft Corp., Pittsburgh, Pa., May 6 to Nov. 1, 1920; Chief Pilot, Mayer Aircraft Corp., Bridgeville, Pa. at present time.
Flying Rating: Reserve Military Aviator.
War Service: Lieut., U. S. Air Service, Oct. 4, 1917 to Feb. 4, 1919; Instructor and Stage Commander.
Member: Pittsburgh Aero Club.
Present Occupation: Chief Pilot, Mayer Aircraft Corp., Bridgeville, Pa.
Address: 4921 Forbes St., Pittsburgh, Pa.

Henry H. Arnold

ARNOLD, HENRY H., Major, Air Service; born, Gladwyne, Pa., June 25, 1886; son of Dr. H. A. Arnold and Louisa H. Arnold; married, Eleanor A. Pool, Sept. 10, 1913.

Educated: Ardmore Grammar School; Ardmore High School; U. S. Military Academy.

Professional: Topographic survey, Philippine Islands, Dec. 1907 to June 1909; 2nd Lieut., 29th Infantry, June 1907 to April 1911, stationed at Philippine Islands and Governor's Island, N. Y.; 1st Lieut., 9th Infantry, Ft. Thomas, Ky., Sept. 1913 to Nov. 1913; 1st Lieut., 13th Infantry, Dec. 1913 to Jan. 1916; 1st Lieut., 3rd Infantry, Jan. 1916 to May 1916; student, Wright Aviation School, Dayton, Ohio, April 1911 to June 1911; pilot and instructor, Signal Corps Aviation School, College Park, Md., June 1911 to Nov. 1911; Supply Officer and Instructor, Signal Corps Aviation School, Augusta, Ga., May 1912; Supply Officer and Instructor, S. C. Aviation School, College Park, Md., May 1912 to Sept. 1912.

Aeronautical Activities: Contestant, Aviation Meet, Nassau Blvd., L. I., Sept. 1911; contestant, Aviation Meet, Salem, N. H., Oct. 1911; observing artillery fire using radio from airplanes for this purpose for first time, Ft. Riley, Kans., Sept. 1912 to Nov. 1912; flew first tractor in U. S. Air Service, July 1912; on duty office Chief Signal Officer in connection with aeronautics, Dec. 1912 to Sept. 1913; Supply Officer, Signal Corps Aviation School, San Diego, Calif., May 1916 to Feb. 1917; commanded and organized, Aviation Service, Panama Canal Zone, Feb. to April 1917; in charge Information Section, Aviation Division S. C., Washington, D. C., April to July 1917; Asst. Executive, Air Division, Washington, D. C., July to Oct. 1917; Executive Officer, Air Division, Oct. 1917 to March 1918; inspection tour in Europe, Sept. to Dec. 1918; Dist. Superintendent, Western Dist., Jan. 1919 to March 1919; C. O., Rockwell Field, March to May 1919; Dept. Air Service Officer, May 1919 to Aug. 1920; Air Officer, 9th Corps Area, Sept. 1, 1920 to date.

Flying Rating: Military Aviator (original), June 5, 1912; Junior Military Aviator, May 20, 1916; Military Aviator, May 20, 1919.

Member: Army and Navy Club (Wash.); Bohemian Club, San Francisco, Calif.

Present Occupation: Air Officer, 9th Corps Area.

Address: Santa Fe Bldg., Room 506; 251 East Terrace Presidio; San Francisco, Calif.

Donald Walker McIlhiney

McILHINEY, DONALD WALKER, Aeronautical Engineer; born, New York City, Jan. 17, 1898, son of Parker C. McIlhiney, A. M., Ph. D. and Clarissa Ann (Walker) McIlhiney.

Educated: New Jersey Military Academy; A. B. 1919, Columbia University.

Professional: Technical Assistant, Research Department, Curtiss Engineering Corp.; Editorial Staff, Automctive Industries; Associate Editor, AVIATION AND AIRCRAFT JOURNAL; 1st Plattsburg officers training camp, 1917; Cornell Ground School; 2nd Lieut., Air Service, May 2, 1918 to April 10, 1919.

Aeronautical Activities: Flying duty from Dec. 26, 1917 to April 10, 1919; 2nd Lieut. A. S. R. C. to date.

Flying Rating: Reserve Military Aviator; Aero Club License; Aero Club Expert Aviators Certificate No. 258.

War Service: April 17, 1917 to April 10, 1919.

Member: Aero Club of America; Society of Automotive Engineers.

Present Occupation: Aeronautical Engineer.

Address: Great Neck, Long Island, N. Y.

Henry Lee Watson

WATSON, HENRY LEE, Major, Air Service; born, Hartford, Conn., Nov. 25, 1883; son of John Henry Watson and Susan M. (Hoffman) Watson; married, Eleanor F. Ewing, Oct. 30, 1912.

Educated: Various private schools in Hartford, Conn., New York, N. Y., and Florence, Italy; 1901 to 1903, Trinity College; 1907, U. S. Military Academy.

Professional: 2nd Lieut., 1st Lieut. and Captain of Cavalry, June 1907 to Oct. 1917; Major, A. S. S. C., Oct. 1917 to Aug. 1918; Lt. Col. Air Service, Aug. 1918 to Feb. 1920; Major, Air Service, Feb. 1920 to date.

Aeronautical Activities: Flying training at Rockwell Field, Calif., March to Oct. 1918; piloted with first party to fly across the Sierra Nevada, March 22, 1919; commanded in turn, Chanute Field, Ill., Nov. 1918 to Jan. 1919, Mather Field, Calif., Jan. to July 1919, March Field, Calif., July to Aug. 1919, Rockwell Field, Calif., Aug. 1919 to March 1920, Mather Field, Calif., April to July 1920.

Flying Rating: Junior Military Aviator, Sept. 5, 1918; Airplane Pilot, Oct. 5, 1920.

Member: Army and Navy Club, Manila, P. I.; Army and Navy Club, Washington, D. C.; Army and Navy Club, New York, N. Y.; St. Anthony Club (N.Y.).

Present Occupation: Air Service Officer, Governor's Island, N. Y.

Address: Governors Island, N. Y.

Harry G. Smith

SMITH, HARRY G., Pilot; born, Diagonal, Iowa, Dec. 8, 1890; son of Rev. W. C. Smith and Mary (Williams) Smith; married, Hazel Veatch, April 23, 1921.

Educated: Indianola High School, Iowa; Mech. Eng. at Iowa State College; A. B. 1917, Simpson College.

Professional: Taught Milford High School, Jan. 13, 1919 to June 1920, Physics, Manual Training, and Athletics.

Aeronautical Activities: Call Field; Served as Flying Instructor 7 months, at Barron Field, test pilot and officer in charge of assembly; Commissioned 2nd Lieut.; general manager and pilot for Milford Aero Club, summer of 1919; pilot for flying boat on Lake Okaboji (Iowa), 1920; accepted in Air Mail service, Aug. 30, 1920; assigned as regular pilot on Omaha-Salt Lake Division, Oct. 3, 1920; from Sept. to Oct. 3, 1920, acted as reserve pilot at Omaha.

Flying Rating: Reserve Military Aviator, March 10, 1918.

Present Occupation: Pilot, Air Mail Service.

Address: Air Mail Field, Cheyenne, Wyo.; home, Dedham, Iowa.

Godfrey L. Cabot

CABOT, GODFREY L., Manufacturer; born, Boston, Mass., Feb. 26, 1861; son of Samuel Cabot and Hannah Lowell (Jackson) Cabot; married, Maria Buckminster Moors, June 23, 1890.

Educated: Brimmer; Boston Latin; J. P. Hopkinson's Private School; M. I. T., special student, 1877 and 1878; A. B. 1882, Harvard University.

Professional: Analytic and consulting chemist from 1882; manufacturing Gas Regulators, 1886; Carbon Black continuously since 1887; gas producer since 1887; oil producer since 1903.

Aeronautical Activities: Pensacola, April 1916 to Jan. 1917; first flight as pilot, April 12, 1917; Commanding Officer, Marblehead Aviation Camp, April 16, 1917.

War Service: As above.

Member: President, Aero Club of New England; Vice President, Aero Club of America.

Present Occupation: Carbon Black, gas, oil.

Address: 940 Old South Bldg., Boston, Mass.; home, 16 Highland St., Cambridge, Mass.

Oliver Patton Echols

ECHOLS, OLIVER PATTON, Capt., Air Service; born, Charlottesville, Va., March 4, 1892; son of Wm. P. Echols and Mary B. Echols; married, Margaret Bailey, Dec. 28, 1920.

Educated: Prep. school; Episcopal high school; Virginia Polytechnic Institute; University of Virginia.

Professional: Engineering Dept., Dupont Powder Co., 1913; Instructor at the Emerson Institute, Washington, D. C., 1914 and 1915; commissioned 2nd Lieut., U. S. Army, 1916.

Aeronautical Activities: U. S. Air Service.

Flying Rating: Aerial Observer.

War Service: Aerial Observer with 1st Aero Squadron at front, 1918; Group Commander 1st Observation Group; Commander, Air Service, 1st Army Corps, A. E. F.; citation by General Pershing.

Present Occupation: Capt. U. S. Army.

Address: Fort Sam Houston, Tex.; home, Universtiy Ave., Charlottesville, Va.

Raymond C. Shrader

SHRADER, RAYMOND C., Stationer; born, Osceola, Nebr., April 6, 1896; son of William M. Shrader and Cornelia M. Shrader.

Educated: Osceola High School.

Professional: Bank Teller and Bookkeeper, 1915; Railroad Clerk, 1916 to May 1917.

Aeronautical Activities: S. M. A. at University of Illinois, 1918; Cadet at Kelly Field, June to Nov. 1918; commissioned Nov. 1918 and discharged in reserve, Dec. 1918.

Flying Rating: Reserve Military Aviator.

War Service: May 1917 to Dec. 1918, U. S. Army.

Present Occupation: Stationer.

Address: 145 No. Harrison St.; home, 435 So. Main St., Pocatello, Idaho.

Archibald Moore Montgomery

MONTGOMERY, ARCHIBALD MOORE, Exporter; born, New York City, Nov. 8, 1897; son of James M. Montgomery and Florence E. Montgomery.

Educated: Pawling, Lawrenceville, 1915; A. B. 1919, Princeton University.

Flying Rating: Ensign, Naval Aviator No. 1406; Aero Club of America Expert's Certificate No. 288.

War Service: American Field Service, 1917; U. S. Naval Air Service, 1918.

Member: Aero Club of America; Princeton Club of New York.

Present Occupation: Exporter.

Address: P. O. Box 888, City Hall Branch; home, 801 West End Ave., New York, N. Y.

Charles Healy Day

DAY, CHARLES HEALY, Aeronautical Engineer; born, Salamanca, N. Y., Dec. 29, 1884; son of Charles Oliver Day and Lucy S. (Healy) Day; married, Gladys Darlington MacCleary, Sept. 1, 1917.

Educated: Grade schools of Salamanca, N. Y. and Hornell, N. Y.; high school of Hornell, N. Y.; 1906, Rensselaer Polytechnic Institute, Troy, N. Y.

Professional: 1904, draughting and design on Climax gas engines with M. H. C. Brombacher, Buffalo, N. Y.; 1905, California for health and mining in Southeast Alaska; 1906, Instructor, Y. M. C. A. auto school, Los Angeles, Calif. and member of firm of Brown and Day, Auto Repair Shop, Los Angeles, Calif.; 1907, running auto stage line from Rhyolite, Nev. to points in Death Valley and the Nevada desert; 1908, Supt. and designing engineer with Klink Motor Car Co., Dansville, N. Y.; 1909, motorcycle sales and repairs at Long Beach, Calif.

Aeronautical Activities: 1909-1910, designed, built and flew tractor biplane powered with motor of own design and manufacture. A conventional biplane structure of 25 ft. spread, 5 ft. chord, trailing ailerons, two wheel landing gear. Motor, a five cyl. semi-radial, fixed cyl. air cooled with tractor screw geared to crank shaft at half speed; 1911, with Glenn L. Martin, designing and building pusher type biplanes at Santa Ana, Calif.; 1912, own airplane factory in Los Angeles, Calif. designing and building Day Tractor Biplanes and other types on order; the Day Tractor, a conventional two place tractor biplane type powered by Hall-Scott 30 hp. motor with tractor screw chain driven at half speed, and advertised and sold, complete at $2500.00; 1913, factory sold and joined Glenn L. Martin Co. as Chief Engineer designing and building tractor type biplanes; 1914, designed and built special looping machine (second in this country to loop) and with DeLloyd Thompson as pilot filled exhibitions throughout the U. S.; 1914, joined Sloane Airplane Co. at Astoria, Long Island, as Chief Engineer; this firm moved to Bound Brook, N. J. and afterward became the Standard Aero Corp. of Plainfield, N. J.; remained as Chief Engineer; the Standard Aircraft Corp. was organized and a plant purchased in Elizabeth, N. J., continued with this firm, as a Vice President, Director and Engineer until the plant closed in 1919, having supervision over all matters pertaining to design and engineering.

Member: Aero Club of America; Flying Club; Society of Automotive Engineers.

Present Occupation: President, Minday Products Corp.

Address: 332 Leland Ave.; home, 720 Berkeley Ave., Plainfield, N. J.

Samuel Reber

REBER, SAMUEL, Col., U. S. Army (retired); born, St. Louis, Mo., Oct. 16, 1864; son of Samuel Reber and Margaret M. (Reese) Reber; married, Cecelia S. Miles, Jan. 10, 1900.

Educated: Washington University; 1886, U. S. Military Academy; 1894 Johns Hopkin's University.

Professional: In U. S. Army since graduation from West Point.

Aeronautical Activities: Ballooning and aviation; Chairman, Contest Committee, A. C. A., 1910-1913; in charge of aviation in U. S. Army, 1913-1916.

Flying Rating: Balloon pilot, A. C. A.

War Service: In Indian Wars; Spanish-American War; Santiago and P. R. Campaign; World War; with 88th and 28th Divisions and H. Q. 2nd Army.

War Honors: Officer de l'Etoile Noire.

Member: Universtiy Club (N. Y.); Army and Navy Club (Wash.); Chevy Chase Club (Wash.).

Present Occupation: (Retired) Army Officer and Consulting Engineer.

Address: 27 Van Dam St., New York, N. Y.

Alvin Carl Reis

REIS, ALVIN CARL, Lawyer; born, Evansville, Ind., March 24, 1892; son of Henry Reis and Caroline (Blass) Reis; married, Olive Reeder, May 14, 1917.

Educated: Evansville High School; A. B. 1913, University of Wisconsin; LL.B. 1917, Harvard Law School.

Professional: Lecturer, 1913-1914; Lawyer, 1919 to date.

Aeronautical Activities: Flying with 26th and 84th French Balloon Companies; Asst. Commander, Balloons, Zone of Advance and First Army, 1918; Commanding Balloons, Fifth Army Corps also Third Army Corps, Dec. 1918 to May 1919.

Flying Rating: Reserve Military Aeronaut.

War Service: A. E. F., Dec. 1917 to July 1919; Aisne-Marne, St. Mihiel, and Meuse-Argonne offensives.

Present Occupation: Counsel, Division of Markets, State of Wisconsin.

Address: State Capitol; home, 2262 West Lawn Ave., Madison, Wis.

Swinging the Prop in Mid-Air

However extraordinary the thing may seem, the accompanying illustration affords proof that a passenger might in an emergency start the engine by swinging the prop—although the practice is not recommended, nor should it be taken as an excuse for not fitting *every* airplane with a self starter.

The illustration shows Wesley May, an aerial acrobat working with Earl Daugherty in Southern California, in the act of taking hold of the propeller of Daugherty's machine

"Swinging the Prop" in Mid-Air, as Photographed from Another Airplane

preparatory to turning it over. The stunt, if it may be called that, was performed over Chateau-Thierry Field, Los Angeles, at a height of 3000 ft., when Daugherty cut the ignition and went into an easy glide. May got out of his cockpit, straddled the engine and, grabbing the propeller, he gave it a sharp turn, on which the engine started again. The performance was repeated three times with success, the last one being at a height of 1500 ft., and photographs—one of which is reproduced here—were taken from another airplane.

Weather Reports for Aviators

Arrangements have been completed by the Navy with the Weather Bureau for the inauguration of a weather reporting service for the benefit of aerial transport in the United States. Starting June 1 it will broadcast daily at 10:30 a. m., eastern time, from its radio station, Arlington, a very comprehensive weather bulletin prepared by the Weather Bureau, which will include weather reports for forty-four towns and cities throughout the eastern half of the United States and Canada; reports for the wind direction and velocity for the various levels of aerial travel from pilot balloon observations made at the naval aerological stations along the Atlantic and Gulf coast and several of the Weather Bureau and Army aerological stations in the interior; a general synopsis of weather conditions in North America; a general forecast of flying conditions for the United States east of the Mississippi River for the succeeding twelve hours; and of conditions off shore along the Atlantic and east Gulf coasts.

This bulletin will be available for use by all commercial companies and individuals interested in the operation of aircraft who are equipped with a radio receiving set.

The bulletin is issued in cooperation with the Office of Communications of the Navy Department, and while it is for the special benefit of marine and aviation interests, being designed especially to meet the needs of the latter, it will also serve a useful purpose for every enterprise in the country in which cognizance of the weather conditions is of importance. It is believed by those who have interested themselves in starting this service that it will prove of tremendous value to aerial travel in the United States, and it is further believed that its possibilities will be such that its expansion to additional sections of the country will necessitate more than one bulletin daily. The location of the aerological stations, the service that conducts them, and the surface stations with which the data are coded are as follows:

Aerological stations	Conducted by	Surface stations with which upper air reports are included.
Rockaway, N. Y.	Navy	New York, N. Y.
Lakehurst, N. J.	Navy	Atlantic City, N. J.
Washington, D. C.	Weather Bureau	Washington, D. C.
Hampton Roads, Va.	Navy	Norfolk, Va.
Parris Island, S. C.	Navy	Charleston, S. C.
Due West, S. C.	Weather Bureau	Columbia, S. C.
Pensacola, Fla.	Navy	Pensacola, Fla.
Key West, Fla.	Weather Bureau	Key West, Fla.
Omaha, Nebr.	Signal Corps.	Fort Omaha, Nebr.

An Interesting Italian Air Station

The accompanying illustration shows the Campo Aviazione (air station) at Foggia Sud, Italy, which is remarkable for the highly centralized arrangement of the buildings, said to be due to the necessity of taking care of a very large aerial activity. The field is located in Southern Italy, and although built during the war, it was intended as a permanent aerodrome.

The buildings, which are of brick and steel, are located in a corner of an approximately square landing field. The field

The Italian Army Air Station at Foggia-Sud, Seen from the Air. The Radial Location of the Buildings Is Noteworthy

that may be seen in the background, can be used for future expansion.

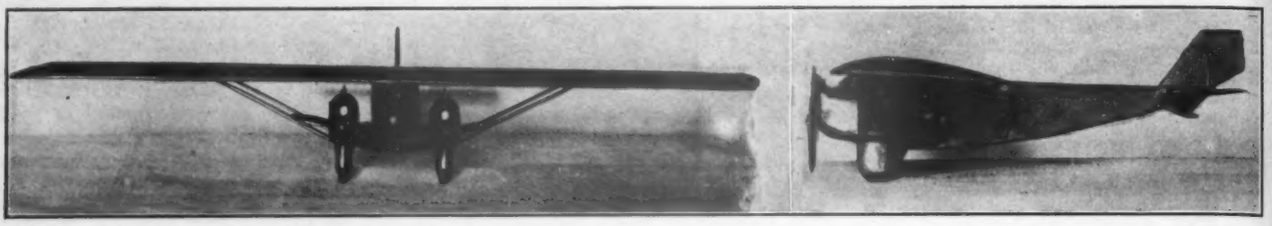
The buildings situated along the edge of the field in the background are as follows: at the extreme left is a small structure for the temporary storage of portable gasoline and oil, a freight warehouse, smaller warehouses for express and mails, a garage and an executive residence at the main entrance to the field.

The buildings in the left foreground are as follows: the road in the foreground are: at the main entrance an information and guard house, a small store, quarters for the employees and a storehouse for spare parts.

The first tier of radially disposed buildings contains executive offices, records, radio station, a public writing room, a hospital, barracks and mess, and a watchtower combined with a radio station and a water supply tank.

The second tier of radially disposed buildings are hangars for ordinary sized airplanes. The hangar at the extreme right is used as a repair and rigging shop.

The buildinngs in the left foreground are as follows: the rather indistinct building is a double hangar for Caproni giant planes, next to which is a carpentry and machine shop. The latter shows a wind cone over a black circle on the roof.



FRONT AND SIDE VIEWS OF A WIND TUNNEL MODEL OF THE NEW TWIN-ENGINED DORNIER G.1 ALL-METAL MONOPLANE, DESCRIBED IN OUR ISSUE OF JUNE 6, 1921

The Altitude Effect on Air Speed Indicators

N.A.C.A. Report No. 110

The object of this paper is to present the results of a theoretical and experimental study of the effect, on the performance of air speed indicators, of the different atmospheric conditions experienced at various altitudes. This matter has ordinarily been handled in a very simple way by following the PV^2 law and therefore correcting the observed reading of the air speed indicator by assuming the differential pressure developed to be directly proportional to the density and independent of any other physical property of the air.

Thermodynamic formulas are available indicating the probable performance of Pitot tubes at high speeds where compressibility has to be considered, but all efforts which have thus far been made to arrive at a sufficiently complete formula for the Venturi tube by purely deductive reasoning have proved impracticable, on account of the difficulty of treating viscosity and turbulence. An adequate method of analysis for such problems has, however, been found in dimensional reasoning, for by this means the minimum number of experimental data needed for providing an absolutely complete inductive rather than deductive solution can be determined. In this way in the present paper the general form of the the size of the instrument, its velocity through the air, and the density, viscosity, and elasticity of the medium has been derived.

The experiments reported all relate to Venturi tubes. They include water channel experiments to determine the degree of dynamical similarity attainable between air and water and to discover whether compressibility has to be taken into account; observations in a wind stream at reduced pressure, i. e., a vacuum wind tunnel, to determine the effect of density and viscosity; airplane observations as a practical check on the laboratory results; also ordinary wind tunnel tests.

At the conclusion of the paper a chart is given containing the most probable results available to date for the relative performance characteristics of five well-known types of air-speed nozzle both American and foreign, involving Venturi tube combinations. This chart provides the necessary experimental basis for computing altitude corrections.

This investigation is primarily of importance in connection with low speed or high altitude flight, for the altitude correction under the conditions of high-speed flight near sea level is sufficiently well given for most instruments by the simple PV^2 law.

A copy of Report No. 110 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Aeromarine Airways, Inc.

Aeromarine Airways, Inc., has concluded a very successful season in its Southern district, where it carried the U. S. mails and several thousand passengers in perfect safety and comfort for a distance of 376,000 passenger miles between Key West and Havana, also Miami, Palm Beach and the Bahama Islands. Aeromarine Airways, Inc., is now ready to carry out its operations in the Northern district, along Long Island Sound, the New England shore resorts and the New York Lake resorts, in conjunction with scheduled runs of New York to Boston, New York to Newport, New York to New London, New York to New Haven, Albany and Atlantic City, and the popular aerial sight-seeing tours of Manhattan Island.

The fleet of the company consists of six 15-passenger flying cruisers, and a number of 6-passenger open cockpit and enclosed cabin flying boats. No effort has been spared to make these ships the most comfortable and the most attractive of any in commercial use today.

Logan Reports Increasing Business

Rapid deliveries and reasonable prices coupled with a large and varied stock appear to account for the rapid expansion of the business of Floyd J. Logan, the Cleveland jobber in airplanes, flying boats, motors and spares.

Mr. Logan reports that his shipments are going to all parts of the United States and expresses great optimism in regard to the increase of aeronautical activities this season. Mr. Logan in a recent letter states "I believe that the agitation for more municipal landing fields and for conservative flying of ships—and only those in good flying condition—are the stepping stones to aeronautical progress."

TWO VIEWS OF THE COMFORTABLE PASSENGER CABIN ON THE DORNIER G.S.II FLYING BOAT, DESCRIBED IN OUR ISSUE OF JUNE 6, 1921

Naval Aircraft Sink Submarine U-117

The first of a series of tests conducted by Army and Navy air forces to determine the effect of aerial bombs on naval vessels, which took place on June 21 off the Virginia Capes, resulted in the quick destruction of the surrendered German submarine U-117.

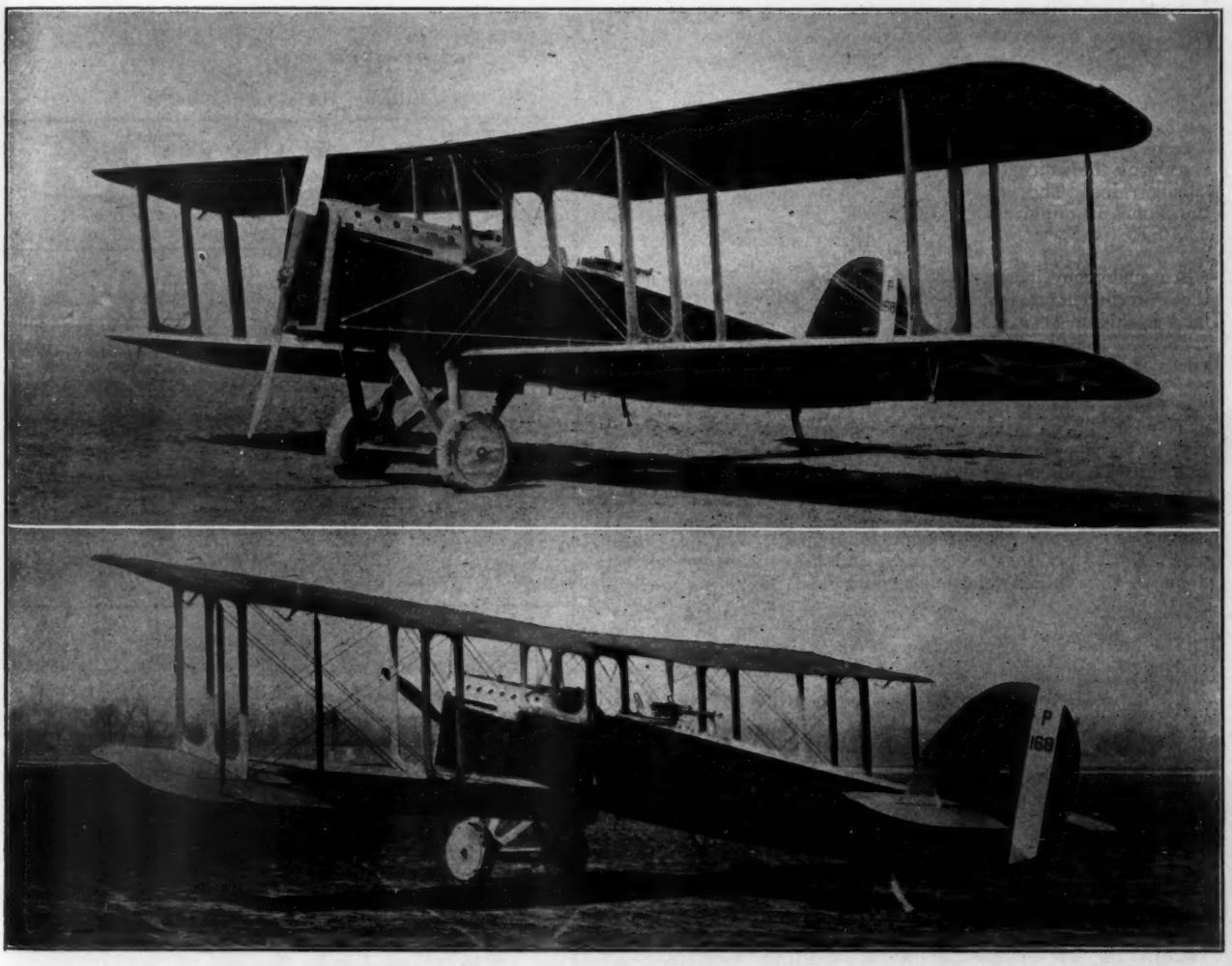
The air forces designated to attack the U-117 consisted of eight divisions of naval flying boats and marine airplanes, totalling twenty-four machines, and twenty-three Army airplanes, or forty-seven aircraft all told. The naval and marine air forces which were to bomb the submarine first, consisted of three divisions of F-5-L flying boats (nine machines), two divisions of NC flying boats (four machines), one division of Glenn Martin bombers (five machines), and one division of DH-4 airplanes (six machines). If they had failed to achieve any result, the Army bombers were to try their hand. The pilots were allowed to attack the target in any manner of formation and at any level consistent with safety.

For the purpose of the test the U-117 was anchored to buoys 60 miles off the Virginia Capes. The U-boat, which was one of a number surrendered by Germany after the Armistice, was 267 ft. long and had a surface displacement of 1164 tons.

The bombing test officially commenced at 9 a. m., when the first naval seaplane division of three F-5-L flying boats, under Lieut. D. Thomas, U. S. N., took off from Hampton Roads and headed for the position of the submarine. At 9:59 a. m. the division was sighted by the vessels of the Atlantic Fleet which were standing by around the U-117, and at 10:23 a. m. the three flying boats let go a first salvo of three 163-lb. Mark IV bombs from an altitude of 1,000 ft. No direct hit was registered, but the target was well bracketed for one bomb fell close to the submarine on the port side while the other two bombs hit to starboard. The seaplanes thereupon made a large circle and headed back upon the target. At 10:32 they let go a second salvo, of nine bombs this time, and two of these scored direct hits just aft of the conning tower. The remaining eight bombs hit in close proximity of the target. Six minutes later the U-117 sank by her bows.

The bombing test was witnessed from various ships by a large number of Army and Navy officers, members of Congress and newspapermen. Capt. W. A. Moffett, Director of Naval Aviation, observed the test in company of Captain H. C. Mustin and Commanders Kenneth Whiting and Spencer from the flying boat NC-8.

The next bombing tests of warships by aircraft will take place on June 28, when the radio-controlled battleship Iowa will be attacked by naval aircraft. The Iowa will be between the latitudes of Capes Hatteras and Henlopen, from 50 to 100 miles off shore at zero hour. The Army Air Service will have its first chance at bombing a warship in advance of the Naval Service on July 13, when Army fliers will attack the surrendered German destroyer G-102.



TWO VIEWS OF THE ARMORED INFANTRY LIAISON AIRPLANE BUILT TO THE DESIGNS OF THE ENGINEERING DIVISION OF THE AIR SERVICE

Airdrome Notes

Greeley, Colo.

The Greeley city council has agreed to level off nine blocks of unimproved land at the south end of the city for a landing field. The Greeley Chamber of Commerce voted to furnish money for leasing the tract for one year, with an option to renew the lease.

The Midwest Airplane Co. will build a hangar on the property during the present month and has agreed to maintain planes there through the summer season for regular service to Cheyenne, Denver, Colorado Springs and Estes Park.

The county will make arrangements with the company to give emergency service for the sheriff and coroner's office when calls are received from distant parts of the county. Some sections are more than 90 miles remote from Greeley, and because of poor trails cannot be reached by auto within three hours' time.

Marshfield, Ore.

Plans are being prepared for a suitable airplane landing field in Marshfield, Ore., by Dr. L. G. Johnson and members of an airplane company which expects to start commercial business soon.

Dr. Johnson stated that the field must be made of such dimensions that it would accommodate any plane which would seek a landing here. The forest patrol planes, in particular, are to be accommodated. The site of the field will be at the old race track grounds, where it is proposed to cut down the curves and make a runway of about 1200 feet, with a width of 150 feet.

Fort Sheridan, Ill.

Fort Sheridan is preparing a landing field on the small-arms target range, to be ready within the next few weeks.

La Crosse, Wis.

Salzer Field, La Crosse, Wis., is again being used as a weeks Lone Rock has been a temporary station on this route, because of the soggy condition of Salzer field during the station on the Chicago-Twin Cities airmail route. For several spring rains. The new turf is now firm enough to support the planes in alighting and taking off.

Fort Royal, Va.

An emergency landing field is to be established on or near the government remount Depot at Fort Royal, Va. Much land is said to be available for the purpose. Captain Ocker, A. S., recently flew over the depot with a photographer to take views of the ground.

Lexington, Ky.

The Lexington Aviation Co. has been formed in Lexington, Ky. The new firm will maintain a school for pilots and intends to engage in all forms of commercial aviation, such as passenger and merchandise carrying, aerial photography, etc. The officers of the company are: Harry S. Brewer, president; Steve B. Featherston, vice-president; Samuel B. Walton, treasurer; Col. Jim Maret, secretary and advertising manager; Jesse O. Creech, general manager and chief pilot.

Dallas, Tex.

The McGraw Aviation Co. has leased a landing field at the end of the city viaduct, less than a mile from the heart of Dallas, Texas, where it expects to carry on various flying activities, including aerial transportation, flying instruction, aerial photography, etc.

The field is in charge of Pilot McGraw, former Army pilot at Mitchel Field, and is under the supervision of the southern branch of the Curtiss Aeroplane & Motor Corp., which furnishes inspection.

Monessen, Pa.

The Monessen Aero Co., the only airplane company operating in the upper Monongahela Valley, has made arrangements for a new flying field on the Sampson farm, which is located near town. Ralf Baer and Pilot David Ruse are in charge of the flying.

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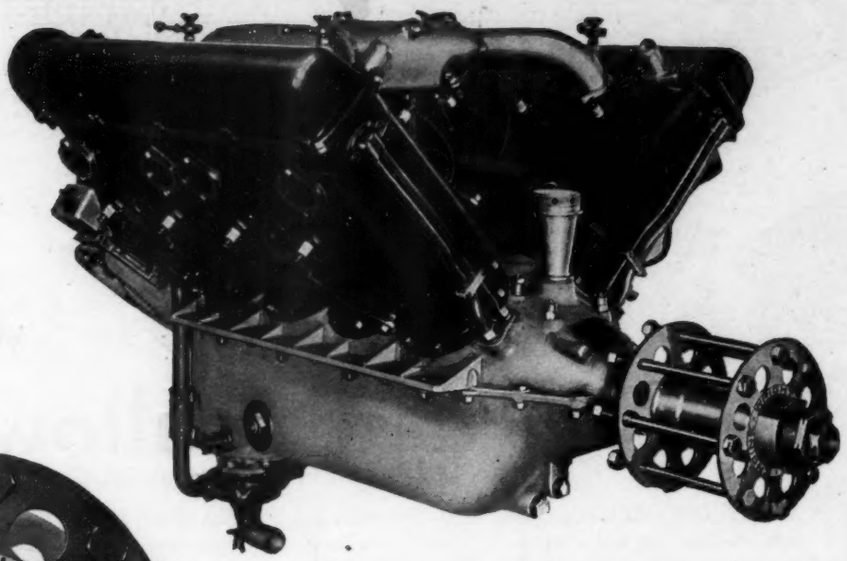

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1. *Lightness per horsepower*	Greater useful load, increased performance.
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3. *Low fuel consumption*	Economy, long travel radius, increased useful load.
4. *Short overall length*	Increased manoeuvreability, compact installation.
5. *Interchangeable parts*	No long repair periods, economy, safety.
6. *Longevity*	Many WRIGHT engines built four years ago are still flying. Many have flown 1,000 hours and over. With th E-2 and H-2 engines incorporating changes based on actual experience from hundreds of our own engines, we advise commercial flyers to figure on ultimate life of 2,000 hours.
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Compare the characteristics of these stock engines now in production with any engine built—foreign or domestic.

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Power at 2000 R. P. M.	220 H. P.	358 H. P.
" " 1800 "	200 H. P.	326 H. P.
Weight, dry with hub	485 lbs.	620 lbs.
Gas per H. P. hour	.48 lbs.	.5 lbs.
Overall length, including hub and mag.	4'-1⅛"	4'-3 23/32"

NOTE:—The power given is the mean rated power, many individual engines give higher power and lower consumption.

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